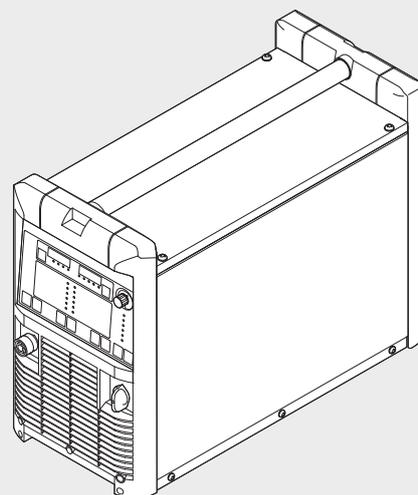


TransSynergic 4000/5000
TransPuls Synergic 2700
TransPuls Synergic
3200/4000/5000
TIME 5000 Digital
CMT 4000 Advanced

EN

Operating instructions

MIG/MAG power source



42,0426,0001,EN 024-15122020

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Safety rules

Explanation of safety notices

DANGER!

Indicates **immediate danger**.

- ▶ If not avoided, death or serious injury will result.

WARNING!

Indicates a **potentially hazardous situation**.

- ▶ If not avoided, death or serious injury may result.

CAUTION!

Indicates a **situation where damage or injury could occur**.

- ▶ If not avoided, minor injury and/or damage to property may result.

NOTE!

Indicates a **risk of flawed results and possible damage to the equipment**.

General

The device is manufactured using state-of-the-art technology and according to recognised safety standards. If used incorrectly or misused, however, it can cause:

- injury or death to the operator or a third party,
- damage to the device and other material assets belonging to the operating company,
- inefficient operation of the device.

All persons involved in commissioning, operating, maintaining and servicing the device must:

- be suitably qualified,
- have sufficient knowledge of welding and
- read and follow these operating instructions carefully.

The operating instructions must always be at hand wherever the device is being used. In addition to the operating instructions, attention must also be paid to any generally applicable and local regulations regarding accident prevention and environmental protection.

All safety and danger notices on the device

- must be in a legible state,
- must not be damaged,
- must not be removed,
- must not be covered, pasted or painted over.

For the location of the safety and danger notices on the device, refer to the section headed "General" in the operating instructions for the device.

Before switching on the device, rectify any faults that could compromise safety.

This is for your personal safety!

Proper use

The device is to be used exclusively for its intended purpose.

The device is intended solely for the welding processes specified on the rating plate. Any use above and beyond this purpose is deemed improper. The manufacturer shall not be held liable for any damage arising from such usage.

Proper use includes:

- carefully reading and following all the instructions given in the operating instructions
 - studying and obeying all safety and danger notices carefully
 - performing all stipulated inspection and maintenance work.
-

Never use the device for the following purposes:

- Thawing out pipes
 - Charging batteries
 - Starting engines
-

The device is designed for use in industry and the workshop. The manufacturer accepts no responsibility for any damage caused through use in a domestic setting.

The manufacturer likewise accepts no liability for inadequate or incorrect results.

Environmental conditions

Operation or storage of the device outside the stipulated area will be deemed as not in accordance with the intended purpose. The manufacturer shall not be held liable for any damage arising from such usage.

Ambient temperature range:

- during operation: -10 °C to + 40 °C (14 °F to 104 °F)
 - during transport and storage: -20 °C to +55 °C (-4 °F to 131 °F)
-

Relative humidity:

- up to 50% at 40 °C (104 °F)
 - up to 90% at 20 °C (68 °F)
-

The surrounding air must be free from dust, acids, corrosive gases or substances, etc. Can be used at altitudes of up to 2000 m (6561 ft. 8.16 in.)

Obligations of the operator

The operator must only allow persons to work with the device who:

- are familiar with the fundamental instructions regarding safety at work and accident prevention and have been instructed in how to use the device
 - have read and understood these operating instructions, especially the section "safety rules", and have confirmed as much with their signatures
 - are trained to produce the required results.
-

Checks must be carried out at regular intervals to ensure that operators are working in a safety-conscious manner.

Obligations of personnel

Before using the device, all persons instructed to do so undertake:

- to observe the basic instructions regarding safety at work and accident prevention
 - to read these operating instructions, especially the "Safety rules" section and sign to confirm that they have understood them and will follow them.
-

Before leaving the workplace, ensure that people or property cannot come to any harm in your absence.

Mains connection

Devices with a higher rating may affect the energy quality of the mains due to their current consumption.

This may affect a number device types in terms of:

- Connection restrictions
- Criteria with regard to the maximum permissible mains impedance ^{*)}
- Criteria with regard to the minimum short-circuit power requirement ^{*)}

^{*)} at the interface with the public grid
see "Technical data"

In this case, the plant operator or the person using the device should check whether the device may be connected, where appropriate by discussing the matter with the power supply company.

IMPORTANT! Ensure that the mains connection is earthed properly

Protecting yourself and others

Anyone working with the device exposes themselves to numerous risks, e.g.

- flying sparks and hot pieces of metal
- Arc radiation, which can damage eyes and skin
- Hazardous electromagnetic fields, which can endanger the lives of those using cardiac pacemakers
- Risk of electrocution from mains current and welding current
- Greater noise pollution
- Harmful welding fumes and gases

Suitable protective clothing must be worn when working with the device. The protective clothing must have the following properties:

- Flame-resistant
- Insulating and dry
- Covers the whole body, is undamaged and in good condition
- Safety helmet
- Trousers with no turn-ups

Protective clothing refers to a variety of different items. Operators should:

- Protect eyes and face from UV rays, heat and sparks using a protective visor and regulation filter
- Wear regulation protective goggles with side protection behind the protective visor
- Wear stout footwear that provides insulation even in wet conditions
- Protect the hands with suitable gloves (electrically insulated and providing protection against heat)
- Wear ear protection to reduce the harmful effects of noise and to prevent injury

Keep all persons, especially children, out of the working area while any devices are in operation or welding is in progress. If, however, there are people in the vicinity:

- Make them aware of all the dangers (risk of dazzling by the arc, injury from flying sparks, harmful welding fumes, noise, possible risks from mains current and welding current, etc.)
- Provide suitable protective equipment
- Alternatively, erect suitable safety screens/curtains.

Noise emission values

The device generates a maximum sound power level of <80 dB(A) (ref. 1pW) when idling and in the cooling phase following operation at the maximum permissible operating point under maximum rated load conditions according to EN 60974-1.

It is not possible to provide a workplace-related emission value during welding (or cutting) as this is influenced by both the process and the environment. All manner of different welding parameters come into play, including the welding process (MIG/MAG, TIG welding), the type of power selected (DC or AC), the power range, the type of weld metal, the resonance characteristics of the workpiece, the workplace environment, etc.

Danger from toxic gases and vapours

The fumes produced during welding contain harmful gases and vapours.

Welding fumes contain substances that cause cancer, as stated in Monograph 118 of the International Agency for Research on Cancer.

Use at-source extraction and a room extraction system.
If necessary, use a welding torch with an integrated extraction device.

Keep your face away from welding fumes and gases.

Fumes and hazardous gases

- must not be breathed in
- must be extracted from the working area using appropriate methods.

Ensure an adequate supply of fresh air. Ensure that there is a ventilation rate of at least 20 m³ per hour at all times.

Otherwise, a welding helmet with an air supply must be worn.

If there is any doubt about whether the extraction capacity is sufficient, the measured toxic emission values should be compared with the permissible limit values.

The following components are responsible, amongst other things, for the degree of toxicity of welding fumes:

- Metals used for the workpiece
- Electrodes
- Coatings
- Cleaners, degreasers, etc.
- Welding process used

The relevant material safety data sheets and manufacturer's specifications for the listed components should therefore be studied carefully.

Recommendations for trade fair scenarios, risk management measures and for identifying working conditions can be found on the European Welding Association website under Health & Safety (<https://european-welding.org>).

Flammable vapours (e.g. solvent fumes) should be kept away from the arc's radiation area.

Close the shielding gas cylinder valve or main gas supply if no welding is taking place.

Danger from flying sparks

Flying sparks may cause fires or explosions.

Never weld close to flammable materials.

Flammable materials must be at least 11 metres (36 ft. 1.07 in.) away from the arc, or alternatively covered with an approved cover.

A suitable, tested fire extinguisher must be available and ready for use.

Sparks and pieces of hot metal may also get into adjacent areas through small gaps or openings. Take appropriate precautions to prevent any danger of injury or fire.

Welding must not be performed in areas that are subject to fire or explosion or near sealed tanks, vessels or pipes unless these have been prepared in accordance with the relevant national and international standards.

Do not carry out welding on containers that are being or have been used to store gases, propellants, mineral oils or similar products. Residues pose an explosive hazard.

Risks from mains current and welding current

An electric shock is potentially life threatening and can be fatal.

Do not touch live parts either inside or outside the device.

During MIG/MAG welding and TIG welding, the welding wire, the weld pool, the feed rollers and all pieces of metal that are in contact with the welding wire are live.

Always set the wirefeeder up on a sufficiently insulated surface or use a suitable, insulated wirefeeder holder.

Make sure that you and others are protected with an adequately insulated, dry base or cover for the earth or ground potential. This base or cover must extend over the entire area between the body and the earth or ground potential.

All cables and leads must be secured, undamaged, insulated and adequately dimensioned. Replace loose connections and scorched, damaged, or inadequately dimensioned cables and leads immediately.

Use the handle to ensure the power connections are tight before every use.

In the case of power cables with a bayonet connector, rotate the power cable around the longitudinal axis by at least 180° and pretension.

Do not wrap cables or leads around the body or parts of the body.

The electrode (rod electrode, tungsten electrode, welding wire, etc.) must

- never be immersed in liquid for cooling
- Never touch the electrode when the power source is switched on.

Double the open circuit voltage of a power source can occur between the welding electrodes of two power sources. Touching the potentials of both electrodes at the same time may be fatal under certain circumstances.

Arrange for the mains cable to be checked regularly by a qualified electrician to ensure the ground conductor is functioning properly.

Protection class I devices require a mains supply with ground conductor and a connector system with ground conductor contact for proper operation.

Operation of the device on a mains supply without ground conductor and on a socket without ground conductor contact is only permitted if all national regulations for protective separation are observed.

Otherwise, this is considered gross negligence. The manufacturer shall not be held liable for any damage arising from such usage.

If necessary, provide adequate earthing for the workpiece.

Switch off unused devices.

Wear a safety harness if working at height.

Before working on the device, switch it off and pull out the mains plug.

Attach a clearly legible and easy-to-understand warning sign to the device to prevent anyone from plugging the mains plug back in and switching it on again.

After opening the device:

- Discharge all live components
- Ensure that all components in the device are de-energised.

If work on live parts is required, appoint a second person to switch off the main switch at the right moment.

Meandering welding currents

If the following instructions are ignored, meandering welding currents can develop with the following consequences:

- Fire hazard
- Overheating of parts connected to the workpiece
- Irreparable damage to ground conductors
- Damage to device and other electrical equipment

Ensure that the workpiece is held securely by the workpiece clamp.

Attach the workpiece clamp as close as possible to the area that is to be welded.

Position the device with sufficient insulation against electrically conductive environments, e.g. Insulation against conductive floor or insulation to conductive racks.

If distribution boards, twin-head mounts, etc., are being used, note the following: The electrode of the welding torch / electrode holder that is not used is also live. Make sure that the welding torch / electrode holder that is not used is kept sufficiently insulated.

In the case of automated MIG/MAG applications, ensure that only an insulated wire electrode is routed from the welding wire drum, large wirefeeder spool or wirespool to the wirefeeder.

EMC Device Classifications

Devices in emission class A:

- Are only designed for use in industrial settings
- Can cause line-bound and radiated interference in other areas

Devices in emission class B:

- Satisfy the emissions criteria for residential and industrial areas. This is also true for residential areas in which the energy is supplied from the public low-voltage mains.

EMC device classification as per the rating plate or technical data.

EMC measures

In certain cases, even though a device complies with the standard limit values for emissions, it may affect the application area for which it was designed (e.g. when there is sensitive equipment at the same location, or if the site where the device is installed is close to either radio or television receivers).

If this is the case, then the operator is obliged to take appropriate action to rectify the situation.

Check and evaluate the immunity to interference of nearby devices according to national and international regulations. Examples of equipment that may be susceptible to interference from the device include:

- Safety devices
- Power, signal and data transfer lines
- IT and telecommunications devices
- Measuring and calibrating devices

Supporting measures for avoidance of EMC problems:

1. Mains supply
 - If electromagnetic interference arises despite correct mains connection, additional measures are necessary (e.g. use a suitable line filter).
2. Welding power leads
 - must be kept as short as possible
 - must run close together (to avoid EMF problems)
 - must be kept well apart from other leads
3. Equipotential bonding
4. Earthing of the workpiece
 - If necessary, establish an earth connection using suitable capacitors.

5. Shielding, if necessary
 - Shield off other nearby devices
 - Shield off entire welding installation

EMF measures

Electromagnetic fields may pose as yet unknown risks to health:

- effects on the health of others in the vicinity, e.g. wearers of pacemakers and hearing aids
- wearers of pacemakers must seek advice from their doctor before approaching the device or any welding that is in progress
- for safety reasons, keep distances between the welding cables and the welder's head/torso as large as possible
- do not carry welding cables and hosepacks over the shoulders or wind them around any part of the body

Specific hazards

Keep hands, hair, clothing and tools away from moving parts. For example:

- Fans
- Cogs
- Rollers
- Shafts
- Wirespools and welding wires

Do not reach into the rotating cogs of the wire drive or into rotating drive components.

Covers and side panels may only be opened/removed while maintenance or repair work is being carried out.

During operation

- Ensure that all covers are closed and all side panels are fitted properly.
- Keep all covers and side panels closed.

The welding wire emerging from the welding torch poses a high risk of injury (piercing of the hand, injuries to the face and eyes, etc.).

Therefore always keep the welding torch away from the body (devices with wire-feed unit) and wear suitable protective goggles.

Never touch the workpiece during or after welding - risk of burns.

Slag can jump off cooling workpieces. The specified protective equipment must therefore also be worn when reworking workpieces, and steps must be taken to ensure that other people are also adequately protected.

Welding torches and other parts with a high operating temperature must be allowed to cool down before handling.

Special provisions apply in areas at risk of fire or explosion - observe relevant national and international regulations.

Power sources for work in areas with increased electric risk (e.g. near boilers) must carry the "Safety" sign. However, the power source must not be located in such areas.

Risk of scalding from escaping coolant. Switch off cooling unit before disconnecting coolant flow or return lines.

Observe the information on the coolant safety data sheet when handling coolant. The coolant safety data sheet may be obtained from your service centre or downloaded from the manufacturer's website.

Use only suitable load-carrying equipment supplied by the manufacturer when transporting devices by crane.

- Hook chains and/or ropes onto all suspension points provided on the load-carrying equipment.
- Chains and ropes must be at the smallest angle possible to the vertical.
- Remove gas cylinder and wire-feed unit (MIG/MAG and TIG devices).

If the wire-feed unit is attached to a crane holder during welding, always use a suitable, insulated wirefeeder hoisting attachment (MIG/MAG and TIG devices).

If the device has a carrying strap or handle, this is intended solely for carrying by hand. The carrying strap is not to be used if transporting with a crane, counterbalanced lift truck or other mechanical hoist.

All lifting accessories (straps, handles, chains, etc.) used in connection with the device or its components must be tested regularly (e.g. for mechanical damage, corrosion or changes caused by other environmental factors).

The testing interval and scope of testing must comply with applicable national standards and directives as a minimum.

Odourless and colourless shielding gas may escape unnoticed if an adapter is used for the shielding gas connection. Prior to assembly, seal the device-side thread of the adapter for the shielding gas connection using suitable Teflon tape.

Requirement for the shielding gas

Especially with ring lines, contaminated shielding gas can cause damage to equipment and reduce welding quality.

Meet the following requirements regarding shielding gas quality:

- Solid particle size < 40 µm
 - Pressure condensation point < -20 °C
 - Max. oil content < 25 mg/m³
-

Use filters if necessary.

Danger from shielding gas cylinders

Shielding gas cylinders contain gas under pressure and can explode if damaged. As the shielding gas cylinders are part of the welding equipment, they must be handled with the greatest of care.

Protect shielding gas cylinders containing compressed gas from excessive heat, mechanical impact, slag, naked flames, sparks and arcs.

Mount the shielding gas cylinders vertically and secure according to instructions to prevent them falling over.

Keep the shielding gas cylinders well away from any welding or other electrical circuits.

Never hang a welding torch on a shielding gas cylinder.

Never touch a shielding gas cylinder with an electrode.

Risk of explosion - never attempt to weld a pressurised shielding gas cylinder.

Only use shielding gas cylinders suitable for the application in hand, along with the correct and appropriate accessories (regulator, hoses and fittings). Only use shielding gas cylinders and accessories that are in good condition.

Turn your face to one side when opening the valve of a shielding gas cylinder.

Close the shielding gas cylinder valve if no welding is taking place.

If the shielding gas cylinder is not connected, leave the valve cap in place on the cylinder.

The manufacturer's instructions must be observed as well as applicable national and international regulations for shielding gas cylinders and accessories.

Danger from escaping shielding gas

Risk of suffocation from the uncontrolled escape of shielding gas

Shielding gas is colourless and odourless and, in the event of a leak, can displace the oxygen in the ambient air.

- Ensure an adequate supply of fresh air with a ventilation rate of at least 20 m³/hour.
- Observe safety and maintenance instructions on the shielding gas cylinder or the main gas supply.
- Close the shielding gas cylinder valve or main gas supply if no welding is taking place.
- Check the shielding gas cylinder or main gas supply for uncontrolled gas leakage before every start-up.

Safety measures at the installation location and during transport

A device toppling over could easily kill someone. Place the device on a solid, level surface such that it remains stable

- The maximum permissible tilt angle is 10°.

Special regulations apply in rooms at risk of fire or explosion

- Observe relevant national and international regulations.

Use internal directives and checks to ensure that the workplace environment is always clean and clearly laid out.

Only set up and operate the device in accordance with the degree of protection shown on the rating plate.

When setting up the device, ensure there is an all-round clearance of 0.5 m (1 ft. 7.69 in.) to ensure that cooling air can flow in and out freely.

When transporting the device, observe the relevant national and local guidelines and accident prevention regulations. This applies especially to guidelines regarding the risks arising during transport.

Do not lift or transport operational devices. Switch off devices before transport or lifting.

Before transporting the device, allow coolant to drain completely and detach the following components:

- Wirefeeder
- Wirespool
- Shielding gas cylinder

After transporting the device, the device must be visually inspected for damage before commissioning. Any damage must be repaired by trained service technicians before commissioning the device.

Safety measures in normal operation

Only operate the device when all safety devices are fully functional. If the safety devices are not fully functional, there is a risk of

- injury or death to the operator or a third party
- damage to the device and other material assets belonging to the operator
- inefficient operation of the device

Any safety devices that are not functioning properly must be repaired before switching on the device.

Never bypass or disable safety devices.

Before switching on the device, ensure that no one is likely to be endangered.

Check the device at least once a week for obvious damage and proper functioning of safety devices.

Always fasten the shielding gas cylinder securely and remove it beforehand if the device is to be transported by crane.

Only the manufacturer's original coolant is suitable for use with our devices due to its properties (electrical conductivity, anti-freeze agent, material compatibility, flammability, etc.).

Only use suitable original coolant from the manufacturer.

Do not mix the manufacturer's original coolant with other coolants.

Only connect the manufacturer's system components to the cooling circuit.

The manufacturer accepts no liability for damage resulting from use of other system components or a different coolant. In addition, all warranty claims will be forfeited.

Cooling Liquid FCL 10/20 does not ignite. The ethanol-based coolant can ignite under certain conditions. Transport the coolant only in its original, sealed containers and keep well away from any sources of ignition.

Used coolant must be disposed of properly in accordance with the relevant national and international regulations. The coolant safety data sheet may be obtained from your service centre or downloaded from the manufacturer's website.

Check the coolant level before starting to weld, while the system is still cool.

Commissioning, maintenance and repair

It is impossible to guarantee that bought-in parts are designed and manufactured to meet the demands made of them, or that they satisfy safety requirements.

- Use only original spare and wearing parts (also applies to standard parts).
 - Do not carry out any modifications, alterations, etc. to the device without the manufacturer's consent.
 - Components that are not in perfect condition must be replaced immediately.
 - When ordering, please give the exact designation and part number as shown in the spare parts list, as well as the serial number of your device.
-

The housing screws provide the ground conductor connection for earthing the housing parts.

Only use original housing screws in the correct number and tightened to the specified torque.

Safety inspection

The manufacturer recommends that a safety inspection of the device is performed at least once every 12 months.

The manufacturer recommends that the power source be calibrated during the same 12-month period.

A safety inspection should be carried out by a qualified electrician

- after any changes are made
 - after any additional parts are installed, or after any conversions
 - after repair, care and maintenance has been carried out
 - at least every twelve months.
-

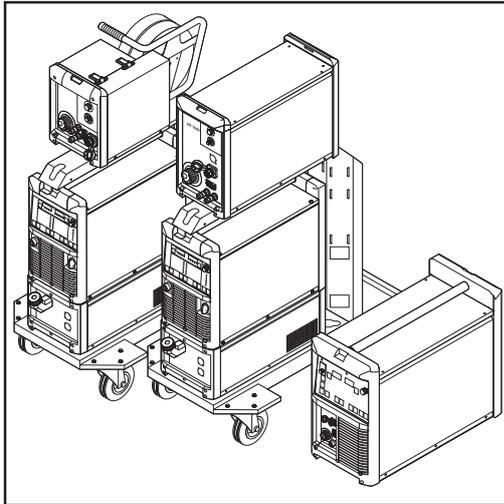
For safety inspections, follow the appropriate national and international standards and directives.

Further details on safety inspection and calibration can be obtained from your service centre. They will provide you on request with any documents you may require.

Disposal	Do not dispose of this device with normal domestic waste! To comply with the European Directive on Waste Electrical and Electronic Equipment and its implementation as national law, electrical equipment that has reached the end of its life must be collected separately and returned to an approved recycling facility. Any device that you no longer require must either be returned to your dealer or given to one of the approved collection and recycling facilities in your area. Ignoring this European Directive may have potentially adverse effects on the environment and your health!
Safety symbols	<p>Devices with the CE mark satisfy the essential requirements of the low-voltage and electromagnetic compatibility directives (e.g. relevant product standards of the EN 60 974 series).</p> <p>Fronius International GmbH hereby declares that the device is compliant with Directive 2014/53/EU. The full text on the EU Declaration of Conformity can be found at the following address: http://www.fronius.com</p> <hr/> <p>Devices marked with the CSA test mark satisfy the requirements of the relevant standards for Canada and the USA.</p>
Data protection	The user is responsible for the safekeeping of any changes made to the factory settings. The manufacturer accepts no liability for any deleted personal settings.
Copyright	<p>Copyright of these operating instructions remains with the manufacturer.</p> <hr/> <p>The text and illustrations are all technically correct at the time of printing. We reserve the right to make changes. The contents of the operating instructions shall not provide the basis for any claims whatsoever on the part of the purchaser. If you have any suggestions for improvement, or can point out any mistakes that you have found in the instructions, we will be most grateful for your comments.</p>

General information

Device concept



TS 4000 / 5000, TPS 3200 / 4000 / 5000 and TPS 2700 welding plants

The TransSynergic (TS) 4000 and TS 5000 and TransPulsSynergic (TPS) 2700, TPS 3200, TPS 4000 and TPS 5000 power sources are fully digitised microprocessor-controlled inverter power sources.

The modular design and potential for system add-ons ensure a high degree of flexibility. The devices can be adapted to any specific situation.

The TransPuls Synergic 2700 features an integral 4-roller drive. There is no longer an interconnecting hosepack between the power source and wire-feed unit. Its compact design makes the TPS 2700 particularly suitable for mobile applications.

All models except the TS 4000/5000 are multiprocess devices:

- MIG/MAG welding
- TIG welding with touchdown ignition (excluding CMT power sources)
- Manual metal arc welding

Functional principle

The central control and regulation unit of the power sources is coupled with a digital signal processor. The central control and regulation unit and the signal processor control the entire welding process.

During the welding process, the actual data is measured continuously and the device responds immediately to any changes. Control algorithms ensure that the desired target state is maintained.

This results in:

- a precise welding process
- exact reproducibility of all results
- excellent weld properties.

Application areas

The devices are used in workshops and industry for manual and automated applications with classical steel, galvanised sheets, chrome/nickel and aluminium.

The integral 4-roller drive, high performance and light weight of the TPS 2700 power source make it the ideal choice for portable applications on building sites or in repair workshops.

The TS 4000/5000 and TPS 3200/4000/5000 power sources are designed for:

- Automobile and component supply industry
- Machinery and rail vehicle construction
- Chemical plant construction
- Equipment construction
- Shipyards, etc.

Warning notices on the device

US power sources come with extra warning notices affixed to the unit. The warning notices must NOT be removed or painted over.

WARNING		ARC RAYS can burn eyes and skin; NOISE can damage hearing. <ul style="list-style-type: none"> Wear welding helmet with correct filter. Wear correct eye, ear and body protection. EXPLODING PARTS can injure. <ul style="list-style-type: none"> Failed parts can explode or cause other parts to explode when power is applied. Always wear a face shield and long sleeves when servicing. ELECTRIC SHOCK can kill; SIGNIFICANT DC VOLTAGE exists after removal of input power <ul style="list-style-type: none"> Always wait 60 seconds after power is turned off before working on unit. Check input capacitor voltage, and be sure it is near 0 before touching parts.
Do not Remove, Destroy, Or Cover This Label		
ARC WELDING can be hazardous. <ul style="list-style-type: none"> Read and follow all labels and the Owner's Manual carefully Only qualified persons are to install, operate, or service this unit according to all applicable codes and safety practices. Keep children away. Pacemaker wearers keep away. Welding wire and drive parts may be at welding voltage. 		
	ELECTRIC SHOCK can kill. <ul style="list-style-type: none"> Always wear dry insulating gloves. Insulate yourself from work and ground. Do not touch live electrical parts. Disconnect input power before servicing. Keep all panels and covers securely in place. 	
	FUMES AND GASES can be hazardous. <ul style="list-style-type: none"> Keep your head out of the fumes. Ventilate area, or use breathing device. Read Material Safety Data Sheets (MSDSs) and manufacturer's instructions for materials used. 	
AVERTISSEMENT		UN CHOC ELECTRIQUE peut etre mortel. <ul style="list-style-type: none"> Installation et raccordement de cette machine doivent etre conformes a tous les pertinents. SOUDAGE A L'ARC peut etre hasardeux. <ul style="list-style-type: none"> Lire le manuel d'instructions avant utilisation. Ne pas installer sur une surface combustible. Les fils de soudage et pieces conductrices peuvent etre a la tension de soudage.
WELDING can cause fire or explosion. <ul style="list-style-type: none"> Do not weld near flammable material. Watch for fire: keep extinguisher nearby. Do not locate unit over combustible surfaces. Do not weld on closed containers. 		

1	1.1	1.2	1.3
2	2.1	2.2	2.3
3	3.1	3.2	3.3
4	4.1		
5	6		

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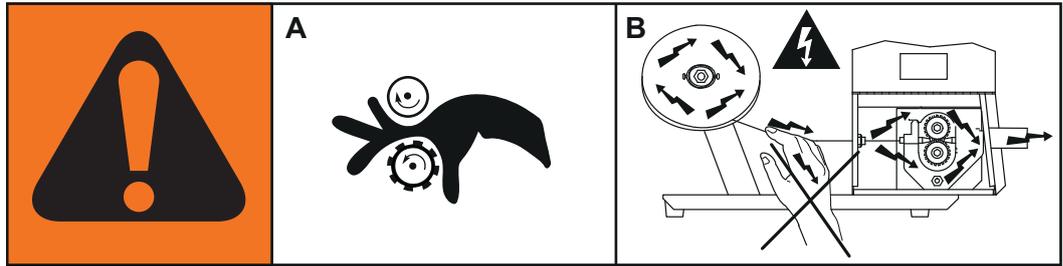
Nur vorhanden bei Stromquelle „TPS 2700“ und auf Drahtvorschüben

Read American National Standard Z49.1, "Safety in Welding and Cutting" From American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126; OSHA Safety and Health Standards, 29 CFR 1910, from U.S. Government Printing Office, Washington, DC 20402. CSA, W117-2 MB7 Code for Safety in Welding and Cutting.

Description of the warning notices on the device

For certain device versions, warning notices are affixed to the device.

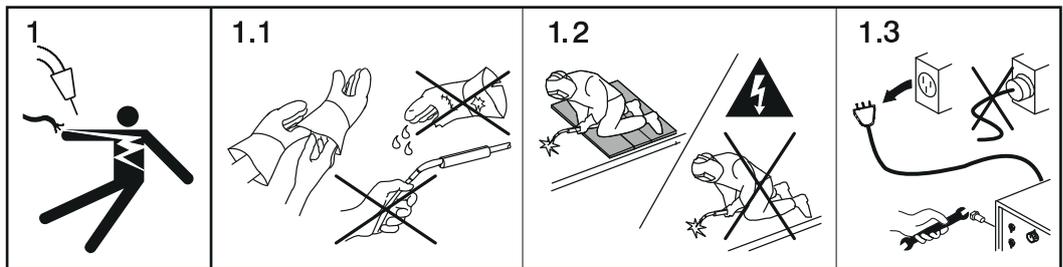
The arrangement of the symbols may vary.



! Warning! Attention!
The symbols represent possible dangers.

A Drive rollers can injure fingers.

B The welding wire and drive parts are live during operation.
 Keep hands and metal objects away!

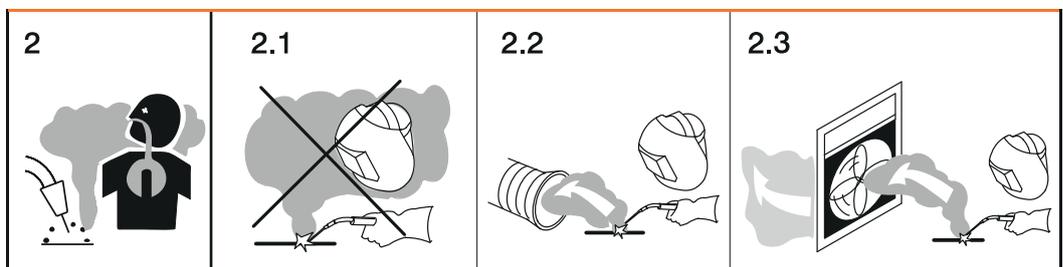


1. An electric shock can be fatal.

1.1 Wear dry, insulating gloves. Do not touch the wire electrode with bare hands. Do not wear wet or damaged gloves.

1.2 Use a base that is insulated from the floor and work area to protect against electric shock.

1.3 Before working on the device, switch off the device and pull out the mains plug or disconnect it from the power supply.

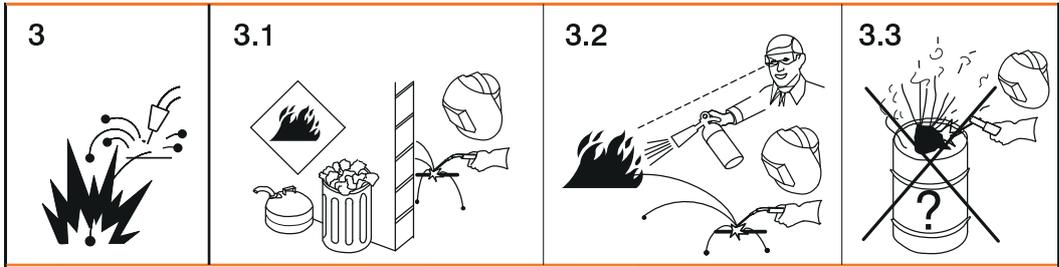


2. Inhalation of welding fumes can be harmful to health.

2.1 Keep your face away from any welding fumes.

2.2 Use forced-air ventilation or a local extraction system to remove welding fumes.

2.3 Remove welding fumes with a fan.

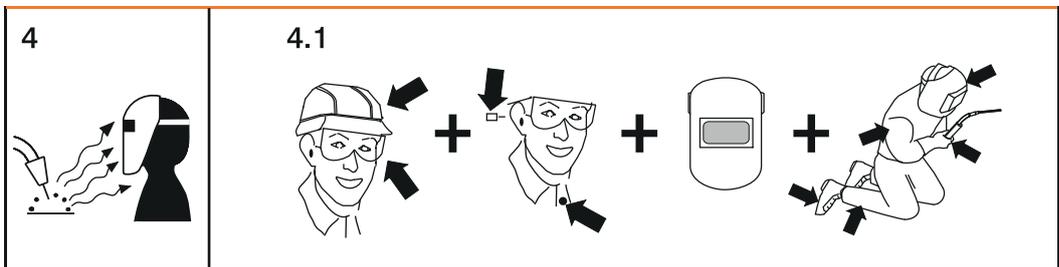


3 Welding sparks can cause an explosion or fire.

3.1 Keep flammable materials away from the welding process. Never weld close to flammable materials.

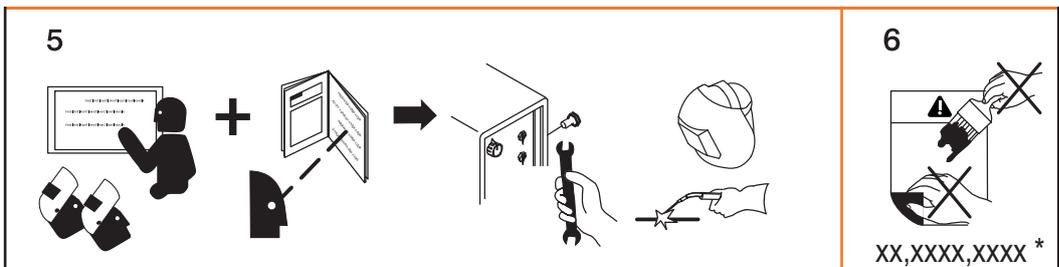
3.2 Welding sparks can cause a fire. Have fire extinguishers to hand. If necessary, have a supervisor ready who can operate the fire extinguisher.

3.3 Do not weld on drums or closed containers.



4. Arc rays can burn the eyes and injure the skin.

4.1 Wear headgear and protective goggles. Use ear protection and a shirt collar with button. Use a welding helmet with the correct tinting. Wear suitable protective clothing over the entire body.



5. Before working on the system or welding: undertake training on the device and read the instructions!

6. Do not remove or paint over the warning sticker.

* Manufacturer order number of the sticker

Special versions

General

Professional processing of specific materials requires welding programs that are specially matched to the different materials in question. The special versions of the digital power sources are perfectly matched to these requirements. As a result the most important welding programs can be called up directly from the operating panel. Furthermore, the power sources are characterised by standard functions that assist the user when welding these materials.

NOTE!

The technical data of the special versions is identical to that of the standard power sources.

Alu edition

The Alu edition power sources were developed for perfect and careful processing of aluminium. Special aluminium welding programs assist in the professional processing of aluminium.

The Alu edition power sources are equipped as standard with the following options:

- Special aluminium welding programs
 - SynchroPulse option
-

CrNi edition

The CrNi edition power sources were developed for perfect and careful processing of CrNi. Special CrNi welding programs assist in the professional processing of high-grade steels. The CrNi edition power sources are equipped as standard with the following options:

- Special CrNi welding programs
- SynchroPulse option
- TIG Comfort Stop option
- TIG welding torch connection
- Gas solenoid valve

NOTE!

It is not possible to install the “Uni Box” system add-on on the CrNi edition (e.g. for the field bus connection of a robot control).

However, the CrNi edition supports a robot connection via ROB 4000 / 5000 robot interfaces.

CMT Variants

In addition to conventional welding processes, the CMT variants also support the CMT process. CMT (Cold Metal Transfer) is a special MIG short-arc process. Its special features include low heat input and a controlled, low-current material transfer.

CMT is suitable for:

- Virtually spatter-free MIG brazing
- Welding on light-gauge sheet with minimal distortion
- Joining steel and aluminium (weld brazing)

**CMT 4000
Advanced**

In addition to the conventional MIG/MAG welding processes, MMA welding and the CMT process, the CMT 4000 Advanced power source supports the improved CMT Advanced process.

The functional principle of the CMT Advanced process is based on a combination arc with negatively polarised CMT cycles and positively polarised CMT cycles or positively polarised pulse cycles. Special features are targeted heat input, a higher deposition rate, better gap bridging properties, precise droplet detachment and an extremely stable arc. CMT Advanced is suitable for:

- joining thin sheets with outstanding gap bridging properties
- High-strength steels with low heat input
- Spots: precisely defined drop volumes and defined heat input
- Root passes with no pool support
- Brazing high-strength and ultra high-strength steels

TIME 5000 Digital Concept

As a universal power source, the TIME 5000 Digital is particularly suited for manual applications. In addition to conventional welding processes, the TIME 5000 Digital also supports the TIME high-performance welding process.

Functional principle

Compared with conventional MIG/MAG processes, the following features bring about faster welding speeds, with an increase in deposition rate of up to 30%:

- Power module with high voltage reserves
- High performance welding programs
- Specially selected shielding gases
- High-performance wire-feed unit with water-cooled disc armature motor for wire feed speeds of up to 30 m/min
- TIME welding torch with dual circuit cooling system

Application

Anywhere where long weld seams, large seam cross-sections and controlled heat input are required, e.g.:

- Mechanical engineering
- Steel engineering
- Crane construction
- Shipbuilding
- Boiler manufacture

The new TIME 5000 Digital power source can also be used in automated applications.

Material types

The high-performance welding process is especially suitable for

- unalloyed steels
- low-alloy steels EN 10027
- fine-grained structural steels up to 890 N/mm²
- steels resistant to low temperatures

Yard edition

Yard edition power sources are designed especially for use in shipyards and offshore applications. The welding programs are designed primarily for steel and CrNi applications with solid and flux cored wires.

Steel edition

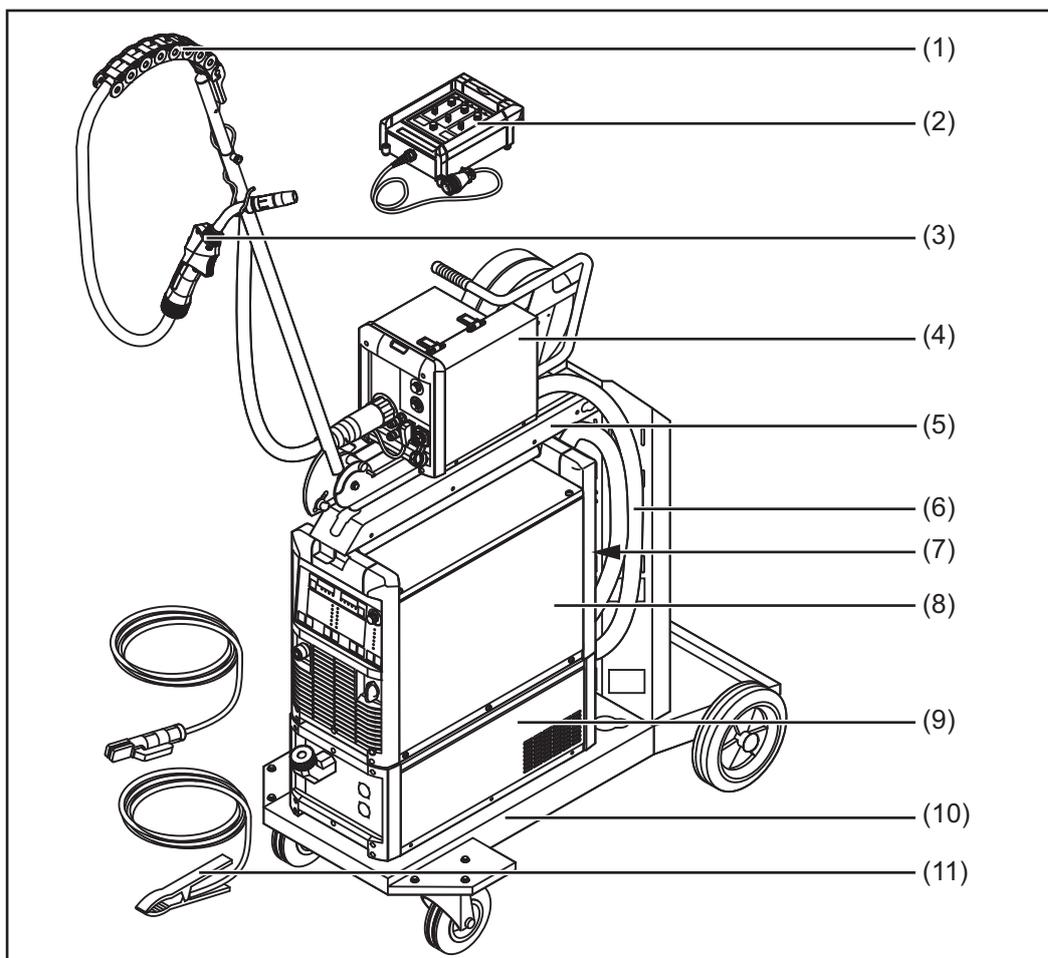
Steel edition power sources are designed specifically for use in the steel sector. The special characteristics can be set on the control panel - both for standard and pulsed arcs.

System components

General

Digital power sources can be run with various system components and options. This makes it possible to optimise procedures and to simplify machine handling and operation, as necessitated by the particular field of application in which the power source is to be used.

Overview



Overview of system components

Legend:

- (1) "Human" hosepack boom
- (2) Remote controls
- (3) Welding torches
- (4) Wire-feed units
- (5) Wire-feed unit mount
- (6) Interconnecting hosepacks
- (7) Robot accessories
- (8) Power sources
- (9) Cooling units
- (10) Trolleys and gas cylinder holders
- (11) Grounding (earthing) cable and electrode cable

Control elements and connections

Description of the control panels

General

The functions on the control panels are all arranged in a logical way. The various welding parameters can easily be selected using buttons and can just as easily be

- altered using buttons or the adjusting dial
- displayed on the digital display during welding

The synergic function ensures that all other welding parameters are adjusted when an individual parameter has been changed.

NOTE!

As a result of software updates, you may find that your device has certain functions that are not described in these operating instructions, or vice versa.

Certain illustrations may also differ slightly from the actual control elements on your device, but these controls function in exactly the same way.

Safety



WARNING!

Danger from incorrect operation.

Possible serious injury and damage to property.

- ▶ Do not use the functions described here until you have read and completely understood these Operating Instructions.
 - ▶ Do not use the functions described here until you have fully read and understood all of the Operating Instructions for the system components, in particular the safety rules!
-

Overview

"Description of the control panels" is composed of the following sections:

- Standard control panel
- Comfort control panel
- "US" control panel
- TIME 5000 Digital control panel
- CMT control panel
- Yard control panel
- Remote control panel
- CMT remote control panel
- CrNi control panel
- Steel control panel

Standard control panel

General

NOTE!

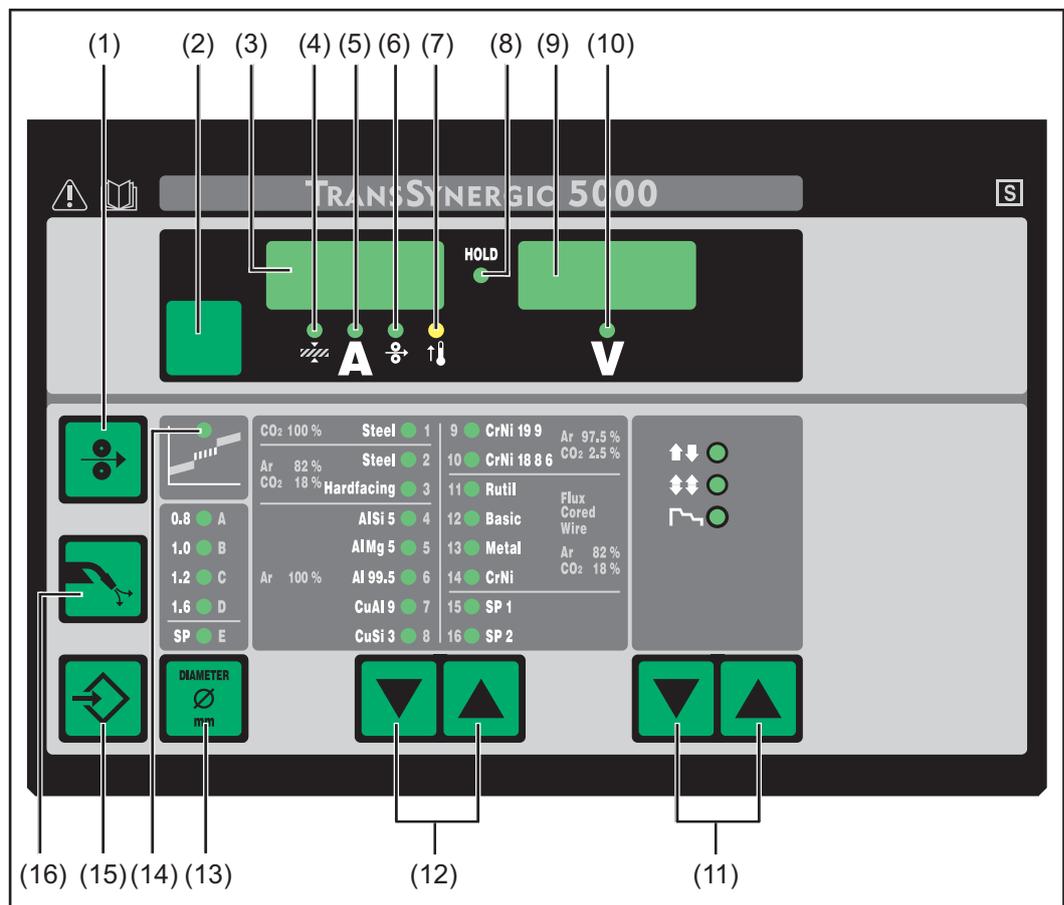
On the Standard control panel, only the MIG/MAG standard synergic welding process is available.

The following processes and functions are not available and cannot be retrofitted:

- ▶ MIG/MAG pulse synergic welding
- ▶ Job mode
- ▶ TIG welding
- ▶ Manual metal arc welding
- ▶ Spot welding

Any changes to the “Welding current” and “Arc-length correction” parameters have to be made on the wire-feed unit.

Standard control panel



No.	Function
(1)	<p>Feeder inching button for feeding the wire electrode into the torch-hosepack without any flow of gas or current</p> <p>For information on the various wire feed sequences that are possible when the welder presses and holds the "Feeder inching" button, see the Fdi parameter in the Setup menu.</p>
(2)	<p>Parameter selection button for selecting the following parameters:</p> <p> Sheet thickness Sheet thickness in mm or in.</p> <p> Welding current Welding current in A Before the start of welding, the machine automatically displays a standard value based on the programmed parameters. During welding, the actual value is displayed.</p> <p> Wire feed speed Wire feed speed in m/min or ipm.</p> <p> Welding voltage Welding voltage in V Before the start of welding, the machine automatically displays a standard value based on the programmed parameters. During welding, the actual value is displayed.</p> <p>If one parameter is selected, then the synergic function means that all other parameters are automatically set as well.</p>
(3)	Left digital display
(4)	Sheet thickness LED lights up when the sheet thickness parameter is selected
(5)	Welding current LED lights up when the welding current parameter is selected
(6)	Wire feed speed LED lights up when the wire feed speed parameter is selected
(7)	Overtemperature indicator lights up if the power source overheats (e.g. because the duty cycle has been exceeded). For more information on this, see the "Troubleshooting" section.
(8)	HOLD indicator every time a welding operation finishes, the actual values for welding current and welding voltage are stored, and the HOLD indicator lights up.
(9)	Right digital display
(10)	Welding voltage LED lights up when the welding voltage parameter is selected
(11)	<p>Mode button for selecting the mode</p> <p> 2-step mode</p> <p> 4-step mode</p> <p> Special 4-step mode (aluminium welding start-up)</p> <p>When a mode is selected, the LED behind the relevant symbol lights up.</p>

No.	Function
(12)	<p>Material button for selecting the filler metal and shielding gas to be used. Parameters SP1 and SP2 are reserved for additional materials.</p> <p>When a material is selected, the LED behind the relevant filler metal lights up.</p>
(13)	<p>Wire diameter button for selecting the diameter of the wire to be used. Parameter SP is reserved for additional wire diameters.</p> <p>When a wire diameter is selected, the LED behind the relevant wire diameter lights up.</p>
(14)	<p>Intermediate arc indicator a spatter-prone intermediate arc occurs between the short arc and the spray arc. The intermediate arc indicator lights up to alert you to this critical area</p>
(15)	<p>Store button for opening the Setup menu</p>
(16)	<p>Gas test button for setting the required gas flow rate on the pressure regulator. Gas will flow out for 30 s after pressing the gas test button. Press the button again to stop the gas test flow before the end of this period.</p>

Key combinations - special functions

The following special functions can be called by pressing buttons simultaneously or repeatedly.

Displaying the feeder inching speed



The set feeder inching speed is shown (e.g.: Fdi | 10 m/min or Fdi | 393.70 ipm).



Alter the feeder inching speed using the Material buttons (12)



Press the Store button to exit.

Displaying the gas pre-flow and gas post-flow time



The set gas pre-flow time is displayed (e.g. GPr | 0.1 s).



Alter the gas pre-flow time using the Material buttons (12)



Then press the Process button (11) to display the gas post-flow time setting (e.g. GPo | 0.5 s)



Alter the gas post-flow time using the Material buttons (12)



Press the Store button to exit.

Displaying the software version

In addition to the software version, these special functions can also be used to display the version number of the welding database, the wire-feed unit number, the software version of the wire-feed unit and the arc burning time.



The software version is displayed



Press the Material button (12) to display the version number of the welding database (e.g.: 0 | 029 = M0029).



Press the Material button (12) again to display the number of the wire-feed unit (A or B in the case of twin-head mounts) and the software version of the wire-feed unit (e.g.: A 1.5 | 0.23).



Press the Material button (12) a third time to display the actual arc burning time since starting for the first time (e.g. "654 | 32.1" = 65,432.1 h = 65,432 h, 6 min)



NOTE! The arc burning time indicator is not suitable as a basis for calculating hiring fees, guarantee, etc.



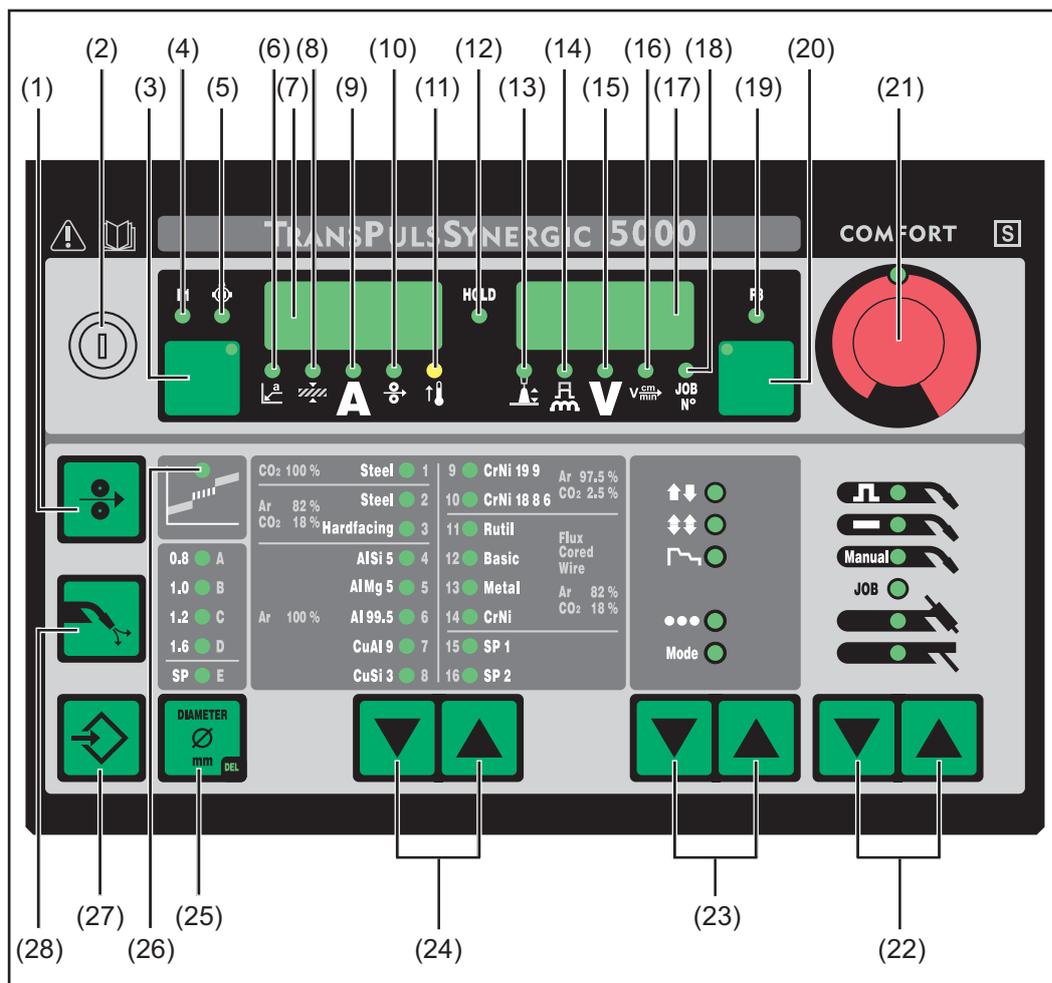
Press the Store button to exit.

Comfort / CrNi / Steel control panel

Difference between Comfort, CrNi and Steel control panels

The Comfort, CrNi and Steel control panels are identical except for the type of material used in their construction. The following section deals specifically with the Comfort control panel, but all the functions described apply equally to the CrNi and Steel control panels.

Comfort control panel



No. Function

- (1) **Feeder inching button**
for feeding the wire electrode into the welding torch-hosepack without any flow of gas or current

For information on the various wire feed sequences that are possible when the welder presses and holds the "Feeder inching" button, see the Fdi parameter in the Setup menu.

No.	Function
(2)	<p>Keylock switch (optional) When the key is in the horizontal position, the following functions are disabled:</p> <ul style="list-style-type: none"> - Selecting the welding process using the Process button(s) (22) - Selecting the mode using the Mode button(s) (23) - Selecting the filler metal using the Material button(s) (24) - Opening the Setup menu using the Store button (27) - Opening the job correction menu (see “Job mode”)
	<p> NOTE! The functions available on the control panel of system components are restricted in the same way as those on the control panel of the power source.</p>
(3)	<p>Parameter selection button for selecting the following parameters:</p> <ul style="list-style-type: none"> <p> a-dimension¹⁾ Dependent on the set welding speed</p> <p> Sheet thickness¹⁾ Sheet thickness in mm or in.</p> <p> Welding current¹⁾ Welding current in A Before the start of welding, the machine automatically displays a standard value based on the programmed parameters. During welding, the actual value is displayed.</p> <p> Wire feed speed¹⁾ Wire feed speed in m/min or ipm.</p> <p> F1 indicator indicates that the current-input PushPull drive is switched on</p> <p> Wire-feed rate drive current-input indicator indicates that the wire-feed rate drive current-input is switched on</p> <p>If the indicators are lit up on the parameter selection button (3) and on the adjusting dial (21), then the indicated/selected parameter can be altered using the adjusting dial (21).</p> <p>1) The synergic function means that if one of these parameters is selected during MIG/MAG pulse synergic welding or MIG/MAG standard synergic welding, then all other parameters including the welding voltage parameter are automatically set as well.</p>
(4)	<p>F1 indicator LED lights up when the F1 indicator parameter is selected</p>
(5)	<p>Wire-feed rate drive current-input indicator LED lights up when the wire-feed rate drive current-input indicator parameter is selected</p>
(6)	<p>a-dimension LED lights up when the a-dimension parameter is selected</p>
(7)	<p>Left digital display</p>
(8)	<p>Sheet thickness LED lights up when the sheet thickness parameter is selected</p>
(9)	<p>Welding current LED lights up when the welding current parameter is selected</p>

No.	Function
(10)	Wire feed speed LED lights up when the wire feed speed parameter is selected
(11)	Overtemperature indicator lights up if the power source overheats (e.g. because the duty cycle has been exceeded). For more information on this, see the "Troubleshooting" section.
(12)	HOLD indicator every time a welding operation finishes, the actual values for welding current and welding voltage are stored, and the HOLD indicator lights up.
(13)	Arc length correction LED lights up when the arc length correction parameter is selected
(14)	Droplet detachment correction/arc force dynamic correction/arc force dynamic LED lights up when the droplet detachment correction/arc force dynamic correction/arc force dynamic parameter is selected
(15)	Welding voltage LED lights up when the welding voltage parameter is selected
(16)	Welding speed LED lights up when the welding speed parameter is selected
(17)	Right digital display
(18)	Job no. LED lights up when the job number parameter is selected
(19)	F3 indicator LED lights up when the F3 indicator parameter is selected

No.	Function
(20)	<p>Parameter selection button for selecting the following parameters:</p> <p> Arc length correction for correcting the arc length</p> <p> Droplet detachment correction/arc force dynamic correction/arc force dynamic has a different function assigned to it, depending on the process being used. A description of the various functions can be found in the Welding chapter under the corresponding process.</p> <p> Welding voltage Welding voltage in V Before the start of welding, the machine automatically displays a standard value based on the programmed parameters. During welding, the actual value is displayed.</p> <p> Welding speed Welding speed in cm/min or ipm (necessary for the a-dimension parameter)</p> <p> Job N° In the job mode process for retrieving parameter records stored under job numbers</p> <p> F3 indicator indicates the real energy inputs in KJ. The real energy input must be activated in level 2 of the Setup menu – parameter EnE. If the indicator is not activated, the coolant flow is displayed when the coolant device FK 4000 Rob is available.</p> <p>If the indicators are lit up on the parameter selection button (20) and on the adjusting dial (21), then the indicated/selected parameter can be altered using the adjusting dial (21).</p>
(21)	<p>Adjusting dial for altering parameters. If the indicator on the adjusting dial is lit up, then the selected parameter is one that can be altered.</p>
(22)	<p>Process button(s) for selecting the welding process</p> <p> MIG/MAG pulse synergic welding</p> <p> MIG/MAG standard synergic welding</p> <p> MIG/MAG standard manual welding</p> <p> Job mode</p> <p> TIG welding with touchdown ignition</p> <p> Manual metal arc welding</p> <p>When a process is selected, the LED on the relevant symbol lights up.</p>

No.	Function
(23)	<p>Mode button for selecting the mode</p> <p> 2-step mode</p> <p> 4-step mode</p> <p> Special 4-step mode (aluminium welding start-up)</p> <p> Spot welding mode</p> <p> Operating mode</p> <p>When a mode is selected, the LED behind the relevant symbol lights up.</p>
(24)	<p>Material button for selecting the filler metal and shielding gas to be used. Parameters SP1 and SP2 are reserved for additional materials.</p> <p>When a material is selected, the LED behind the relevant filler metal lights up.</p>
(25)	<p>Wire diameter button for selecting the diameter of the wire to be used. Parameter SP is reserved for additional wire diameters.</p> <p>When a wire diameter is selected, the LED behind the relevant wire diameter lights up.</p>
(26)	<p>Intermediate arc indicator a spatter-prone intermediate arc occurs between the short arc and the spray arc. The intermediate arc indicator lights up to alert you to this critical area</p>
(27)	<p>Store button for opening the Setup menu</p>
(28)	<p>Gas test button for setting the required gas flow rate on the gas pressure regulator. After pressing this button, gas flows for 30 seconds. Press the button again to stop the gas test flow before the end of this period.</p>

Key combinations - special functions

The following special functions can be called by pressing buttons simultaneously or repeatedly.

Displaying the feeder inching speed



The set feeder inching speed is shown (e.g.: Fdi | 10 m/min or Fdi | 393.70 ipm).



Use the adjusting dial to change the feeder inching speed



Press the Store button to exit.

Displaying the gas pre-flow and gas post-flow time



The set gas pre-flow time is displayed (e.g. GPr | 0.1 s)



Use the adjusting dial to change the gas pre-flow time



Then press the Process button (22) to display the gas post-flow time setting (e.g. GPo | 0.5 s)



Use the adjusting dial to change the gas post-flow time



Press the Store button to exit.

Displaying the software version

In addition to the software version, these special functions can also be used to display the version number of the welding database, the wire-feed unit number, the software version of the wire-feed unit and the arc burning time.



The software version is displayed



Press the Material button (24) to display the version number of the welding database (e.g.: 0 | 029 = M0029).



Press the Material button (24) again to display the number of the wire-feed unit (A or B in the case of twin-head mounts) and the software version of the wire-feed unit (e.g.: A 1.5 | 0.23).



Press the Material button (24) a third time to display the actual arc burning time since starting for the first time (e.g. "654 | 32.1" = 65,432.1 h = 65,432 h, 6 min)



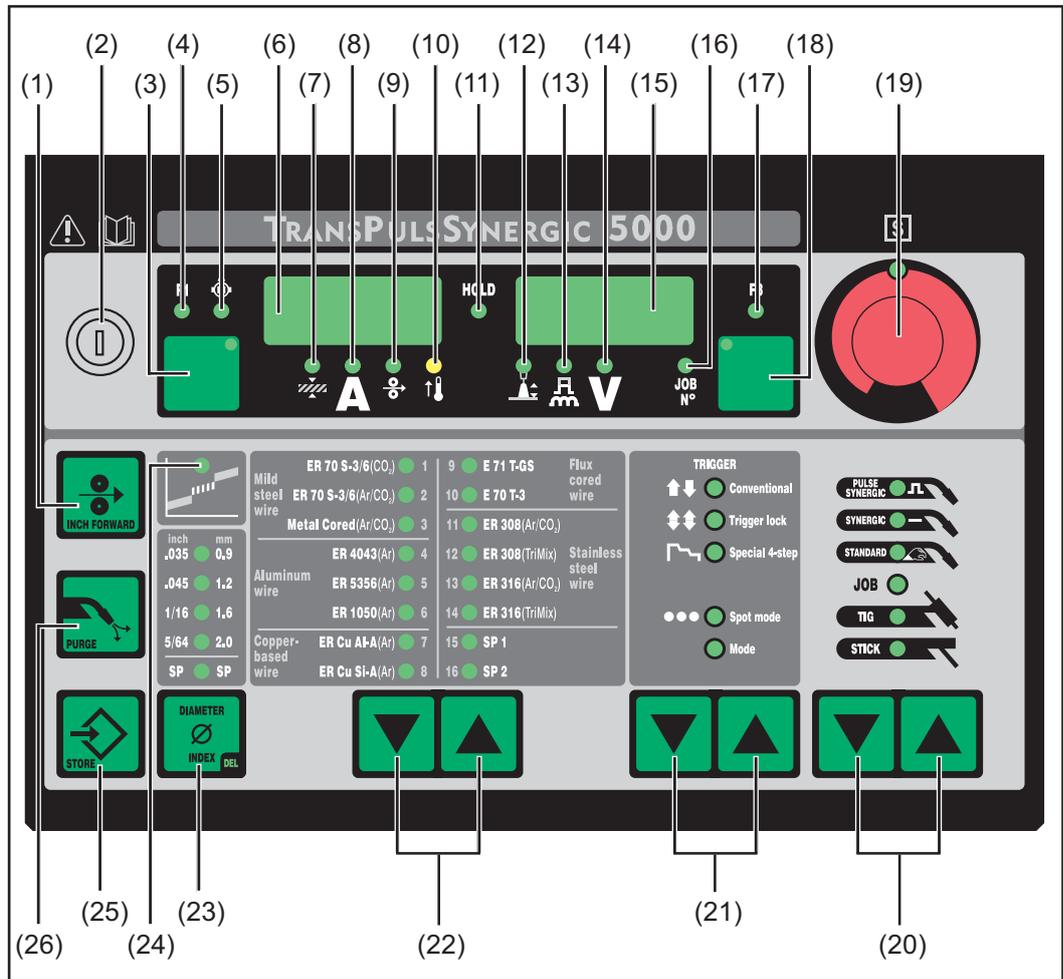
NOTE! The arc burning time indicator is not suitable as a basis for calculating hiring fees, guarantee, etc.



Press the Store button to exit.

US control panel

US control panel



No.	Function
(1)	Inch Forward (feeder inching) button for feeding the wire electrode into the torch-hosepack with no accompanying flow of gas or current
(2)	Keylock switch (optional) When the key is in the horizontal position, the following functions are disabled: - Selecting the welding process using the Process button(s) (20) - Selecting the mode using the Mode button(s) (21) - Selecting the filler metal using the Material button(s) (22) - Opening the Setup menu using the Store button (25) - Opening the job correction menu (see "Job mode")

(1) **Inch Forward (feeder inching) button**
for feeding the wire electrode into the torch-hosepack with no accompanying flow of gas or current

For information on the various wire feed sequences that are possible when the welder presses and holds the "Feeder inching" button, see the Fdi parameter in the Setup menu.

- (2) **Keylock switch (optional)**
When the key is in the horizontal position, the following functions are disabled:
- Selecting the welding process using the Process button(s) (20)
 - Selecting the mode using the Mode button(s) (21)
 - Selecting the filler metal using the Material button(s) (22)
 - Opening the Setup menu using the Store button (25)
 - Opening the job correction menu (see "Job mode")



NOTE! The functions available on the control panel of system components are restricted in the same way as those of the control panel on the power source.

No.	Function
(3)	<p>Parameter selection button for selecting the following parameters:</p> <p> Sheet thickness¹⁾ Sheet thickness in mm or in.</p> <p> Welding current¹⁾ Welding current in A Before the start of welding, the machine automatically displays a standard value based on the programmed parameters. During welding, the actual value is displayed.</p> <p> Wire feed speed¹⁾ Wire feed speed in m/min or ipm.</p> <p> F1 indicator indicates that the PushPull drive is switched on</p> <p> Wire-feed unit drive current-input indicator indicates that the wire-feed unit drive is switched on</p> <p>If the indicators are lit up on the parameter selection button (3) and on the adjusting dial (19), then the indicated / selected parameter can be altered using the adjusting dial (19).</p> <p>1) The synergic function means that if one of these parameters is selected during MIG/MAG pulse synergic welding or MIG/MAG standard synergic welding, then all other parameters including the welding voltage parameter are automatically set as well.</p>
(4)	<p>F1 indicator LED lights up when the F1 indicator parameter is selected</p>
(5)	<p>Wire-feed unit drive current-input indicator LED lights up when the wire-feed unit drive current-input indicator parameter is selected</p>
(6)	<p>Left digital display</p>
(7)	<p>Sheet thickness LED lights up when the sheet thickness parameter is selected</p>
(8)	<p>Welding current LED lights up when the welding current parameter is selected</p>
(9)	<p>Wire feed speed LED lights up when the wire feed speed parameter is selected</p>
(10)	<p>Overtemperature indicator lights up if the power source overheats (e.g. because the duty cycle has been exceeded). For more information on this, see the "Troubleshooting" section.</p>
(11)	<p>HOLD indicator every time a welding operation finishes, the actual values for welding current and welding voltage are stored, and the HOLD indicator lights up.</p>
(12)	<p>Arc length correction LED lights up when the arc length correction parameter is selected</p>
(13)	<p>Droplet detachment correction/arc force dynamic correction/arc force dynamic LED lights up when the Droplet detachment correction/arc force dynamic correction/arc force dynamic parameter is selected</p>

No.	Function
(14)	Welding voltage LED lights up when the welding voltage parameter is selected
(15)	Right digital display
(16)	Job no. LED lights up when the job number parameter is selected
(17)	F3 indicator LED lights up when the F3 indicator parameter is selected
(18)	Parameter selection button for selecting the following parameters: <ul style="list-style-type: none">  Arc length correction for correcting the arc length  Droplet detachment correction/arc force dynamic correction/arc force dynamic has a different function assigned to it, depending on the process being used. A description of the various functions can be found in the Welding chapter under the corresponding process.  Welding voltage Welding voltage in V Before the start of welding, the machine automatically displays a standard value based on the programmed parameters. During welding, the actual value is displayed.  Job N° In the job mode process for retrieving parameter records stored under job numbers  F3 indicator indicates the real energy inputs in KJ. The real energy input must be activated in level 2 of the Setup menu – parameter EnE. If the indicator is not activated, the coolant flow is displayed when the coolant device FK 4000 Rob is available. <p>If the indicators are lit up on the parameter selection button (18) and on the adjusting dial (19), then the indicated / selected parameter can be altered using the adjusting dial (19).</p>
(19)	Adjusting dial for altering welding parameters. If the indicator on the adjusting dial is lit up, then the selected parameter is one that can be altered.
(20)	Process button(s) for selecting the welding process <ul style="list-style-type: none">  MIG/MAG pulse synergic welding  MIG/MAG standard synergic welding  MIG/MAG standard manual welding  Job mode  TIG welding with touchdown ignition  Manual metal arc welding <p>When a process is selected, the LED on the relevant symbol lights up.</p>

No.	Function
(21)	<p>Mode button for selecting the mode</p> <p> Conventional 2-step mode</p> <p> Trigger lock 4-step mode</p> <p> Special setup Special 4-step mode (aluminium welding start-up)</p> <p> Spot mode Spot welding mode</p> <p> Mode Operating mode</p> <p>When a mode is selected, the LED behind the relevant symbol lights up.</p>
(22)	<p>Material button for selecting the filler metal and shielding gas to be used. Parameters SP1 and SP2 are reserved for additional materials.</p> <p>When a material is selected, the LED behind the relevant filler metal lights up.</p>
(23)	<p>Diameter / Index (wire diameter) button for selecting the diameter of the wire to be used. Parameter SP is reserved for additional wire diameters.</p> <p>When a wire diameter is selected, the LED behind the relevant wire diameter lights up.</p>
(24)	<p>Intermediate arc indicator a spatter-prone intermediate arc occurs between the short arc and the spray arc. The intermediate arc indicator lights up to alert you to this critical area</p>
(25)	<p>Store button for opening the Setup menu</p>
(26)	<p>Purge (Gas test) button for setting the required gas flow rate on the pressure regulator. Gas will flow out for 30 s after pressing the gas test button. Press the button again to stop the gas test flow before the end of this period.</p>

Key combinations - special functions

The following special functions can be called by pressing buttons simultaneously or repeatedly.

Displaying the feeder inching speed



The set feeder inching speed is shown (e.g.: Fdi | 10 m/min or Fdi | 393.70 ipm).



Use the adjusting dial to change the feeder inching speed



Press the Store button to exit.

Displaying the gas pre-flow and gas post-flow time



The set gas pre-flow time is displayed (e.g. GPr | 0.1 s)



Use the adjusting dial to change the gas pre-flow time



Then press the Process button (20) to display the gas post-flow time setting (e.g. GPo | 0.5 s)



Use the adjusting dial to change the gas post-flow time



Press the Store button to exit.

Displaying the software version

In addition to the software version, these special functions can also be used to display the version number of the welding database, the wire-feed unit number, the software version of the wire-feed unit and the arc burning time.



The software version is displayed



Press the Material button (22) to display the version number of the welding database (e.g.: 0 | 029 = M0029).



Press the Material button (22) again to display the number of the wire-feed unit (A or B in the case of twin-head mounts) and the software version of the wire-feed unit (e.g.: A 1.5 | 0.23).



Press the Material button (22) a third time to display the actual arc burning time since starting for the first time (e.g. "654 | 32.1" = 65,432.1 h = 65,432 h, 6 min)



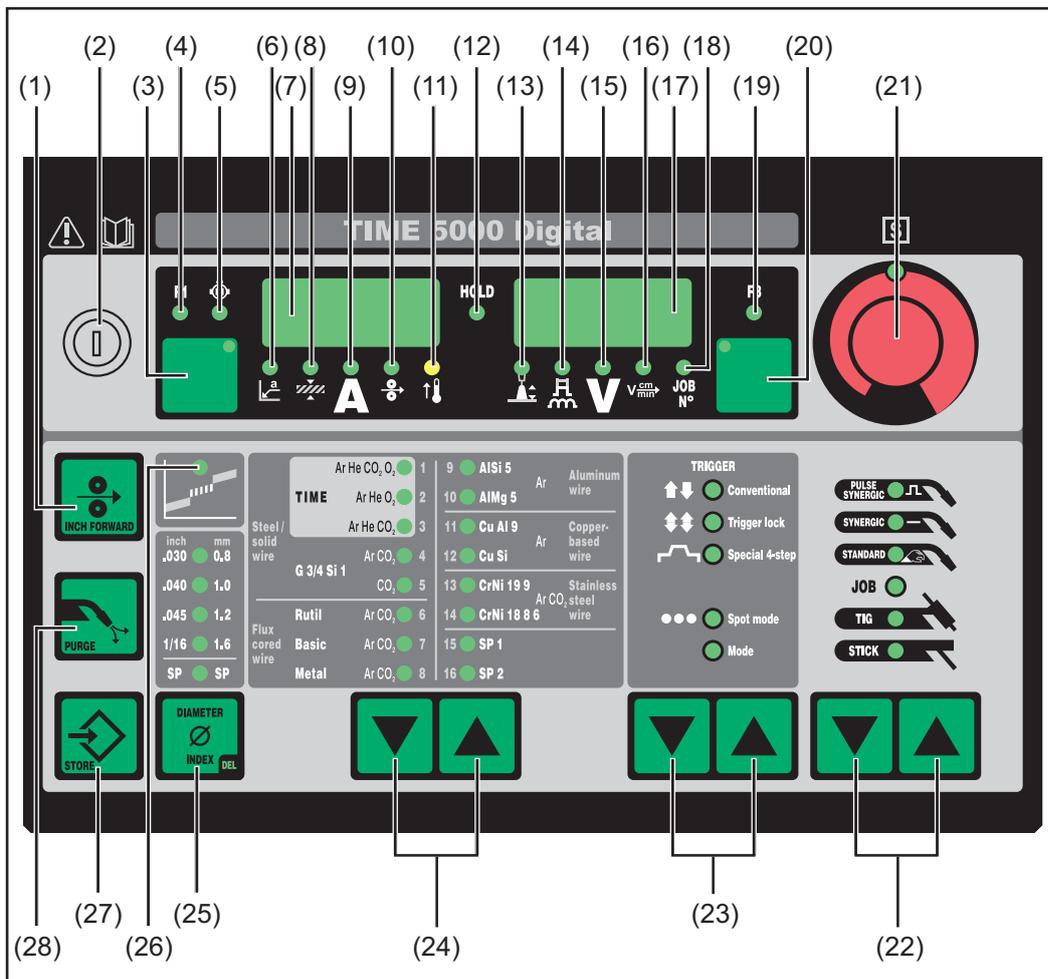
NOTE! The arc burning time indicator is not suitable as a basis for calculating hiring fees, guarantee, etc.



Press the Store button to exit.

TIME 5000 Digital control panel

TIME 5000 Digital control panel



No. Function

- (1) **Inch Forward (feeder inching) button**
for feeding the wire electrode into the torch-hosepack with no accompanying flow of gas or current

For information on the various wire feed sequences that are possible when the welder presses and holds the "Feeder inching" button, see the Fdi parameter in the Setup menu.

- (2) **Keylock switch (optional)**
When the key is in the horizontal position, the following functions are disabled:
- Selecting the welding process using the Process button(s) (20)
 - Selecting the mode using the Mode button(s) (21)
 - Selecting the filler metal using the Material button(s) (22)
 - Opening the Setup menu using the Store button (25)
 - Opening the job correction menu (see "Job mode")



NOTE! The functions available on the control panel of system components are restricted in the same way as those of the control panel on the power source.

No.	Function
(3)	<p>Parameter selection button for selecting the following parameters:</p> <p> a-dimension¹⁾ depending on the set welding speed</p> <p> Sheet thickness¹⁾ Sheet thickness in mm or in.</p> <p> Welding current¹⁾ Welding current in A Before the start of welding, the machine automatically displays a standard value based on the programmed parameters. During welding, the actual value is displayed.</p> <p> Wire feed speed¹⁾ Wire feed speed in m/min or ipm.</p> <p> F1 indicator indicates that the PushPull drive is switched on</p> <p> Wire-feed unit drive current-input indicator indicates that the wire-feed unit drive is switched on</p>

If the indicators are lit up on the parameter selection button (3) and on the adjusting dial (19), then the indicated / selected parameter can be altered using the adjusting dial (19).

- 1) The synergic function means that if one of these parameters is selected during MIG/MAG pulse synergic welding or MIG/MAG standard synergic welding, then all other parameters including the welding voltage parameter are automatically set as well.

(4)	<p>F1 indicator LED lights up when the F1 indicator parameter is selected</p>
(5)	<p>Wire-feed unit drive current-input indicator LED lights up when the wire-feed unit drive current-input indicator parameter is selected</p>
(6)	<p>a-dimension LED lights up when the a-dimension parameter is selected</p>
(7)	<p>Left digital display</p>
(8)	<p>Sheet thickness LED lights up when the sheet thickness parameter is selected</p>
(9)	<p>Welding current LED lights up when the welding current parameter is selected</p>
(10)	<p>Wire feed speed LED lights up when the wire feed speed parameter is selected</p>
(11)	<p>Overtemperature indicator lights up if the power source overheats (e.g. because the duty cycle has been exceeded). For more information on this, see the "Troubleshooting" section.</p>
(12)	<p>HOLD indicator every time a welding operation finishes, the actual values for welding current and welding voltage are stored, and the HOLD indicator lights up.</p>
(13)	<p>Arc length correction LED lights up when the arc length correction parameter is selected</p>

No.	Function
(14)	<p>Droplet detachment correction/arc force dynamic correction/arc force dynamic LED lights up when the Droplet detachment correction/arc force dynamic correction/arc force dynamic parameter is selected</p>
(15)	<p>Welding voltage LED lights up when the welding voltage parameter is selected</p>
(16)	<p>Welding speed LED lights up when the welding speed parameter is selected</p>
(17)	<p>Right digital display</p>
(18)	<p>Job no. LED lights up when the job number parameter is selected</p>
(19)	<p>F3 indicator LED lights up when the F3 indicator parameter is selected</p>
(20)	<p>Parameter selection button for selecting the following parameters:</p> <ul style="list-style-type: none">  <p>Arc length correction for correcting the arc length</p>  <p>Droplet detachment correction/arc force dynamic correction/arc force dynamic has a different function assigned to it, depending on the process being used. A description of the various functions can be found in the Welding chapter under the corresponding process.</p>  <p>Welding voltage Welding voltage in V Before the start of welding, the machine automatically displays a standard value based on the programmed parameters. During welding, the actual value is displayed.</p>  <p>Welding speed Welding speed in cm/min or ipm (necessary for the a-dimension parameter)</p>  <p>Job N° In the job mode process for retrieving parameter records stored under job numbers</p>  <p>F3 indicator indicates the real energy inputs in KJ. The real energy input must be activated in level 2 of the Setup menu – parameter EnE. If the indicator is not activated, the coolant flow is displayed when the coolant device FK 4000 Rob is available.</p> <p>If the indicators are lit up on the parameter selection button (20) and on the adjusting dial (21), then the indicated / selected parameter can be altered using the adjusting dial (21).</p>
(21)	<p>Adjusting dial for altering welding parameters. If the indicator on the adjusting dial is lit up, then the selected parameter is one that can be altered.</p>

No.	Function
(22)	<p>Process button(s) for selecting the welding process</p> <p> MIG/MAG pulse synergic welding</p> <p> MIG/MAG standard synergic welding</p> <p> MIG/MAG standard manual welding</p> <p> Job mode</p> <p> TIG welding with touchdown ignition</p> <p> Manual metal arc welding</p> <p>When a process is selected, the LED on the relevant symbol lights up.</p>
(23)	<p>Mode button for selecting the mode</p> <p> 2-step mode</p> <p> 4-step mode</p> <p> Special 4-step mode (aluminium welding start-up)</p> <p> Spot welding mode</p> <p> Operating mode</p> <p>When a mode is selected, the LED behind the relevant symbol lights up.</p>
(24)	<p>Material button for selecting the filler metal and shielding gas to be used. Parameters SP1 and SP2 are reserved for additional materials.</p> <p>When a material is selected, the LED behind the relevant filler metal lights up.</p>
(25)	<p>Diameter / Index (wire diameter) button for selecting the diameter of the wire to be used. Parameter SP is reserved for additional wire diameters.</p> <p>When a wire diameter is selected, the LED behind the relevant wire diameter lights up.</p>
(26)	<p>Intermediate arc indicator a spatter-prone intermediate arc occurs between the short arc and the spray arc. The intermediate arc indicator lights up to alert you to this critical area</p>
(27)	<p>Store button for opening the Setup menu</p>
(28)	<p>Purge (Gas test) button for setting the required gas flow rate on the pressure regulator. Gas will flow out for 30 s after pressing the gas test button. Press the button again to stop the gas test flow before the end of this period.</p>

Key combinations - special functions

The following special functions can be called by pressing buttons simultaneously or repeatedly.

Displaying the feeder inching speed



The set feeder inching speed is shown (e.g.: Fdi | 10 m/min or Fdi | 393.70 ipm).



Use the adjusting dial to change the feeder inching speed



Press the Store button to exit.

Displaying the gas pre-flow and gas post-flow time



The set gas pre-flow time is displayed (e.g. GPr | 0.1 s)



Use the adjusting dial to change the gas pre-flow time



Then press the Process button (20) to display the gas post-flow time setting (e.g. GPo | 0.5 s)



Use the adjusting dial to change the gas post-flow time



Press the Store button to exit.

Displaying the software version

In addition to the software version, these special functions can also be used to display the version number of the welding database, the wire-feed unit number, the software version of the wire-feed unit and the arc burning time.



The software version is displayed



Press the Material button (24) to display the version number of the welding database (e.g.: 0 | 029 = M0029).



Press the Material button (24) again to display the number of the wire-feed unit (A or B in the case of twin-head mounts) and the software version of the wire-feed unit (e.g.: A 1.5 | 0.23).



Press the Material button (24) a third time to display the actual arc burning time since starting for the first time (e.g. "654 | 32.1" = 65,432.1 h = 65,432 h, 6 min)



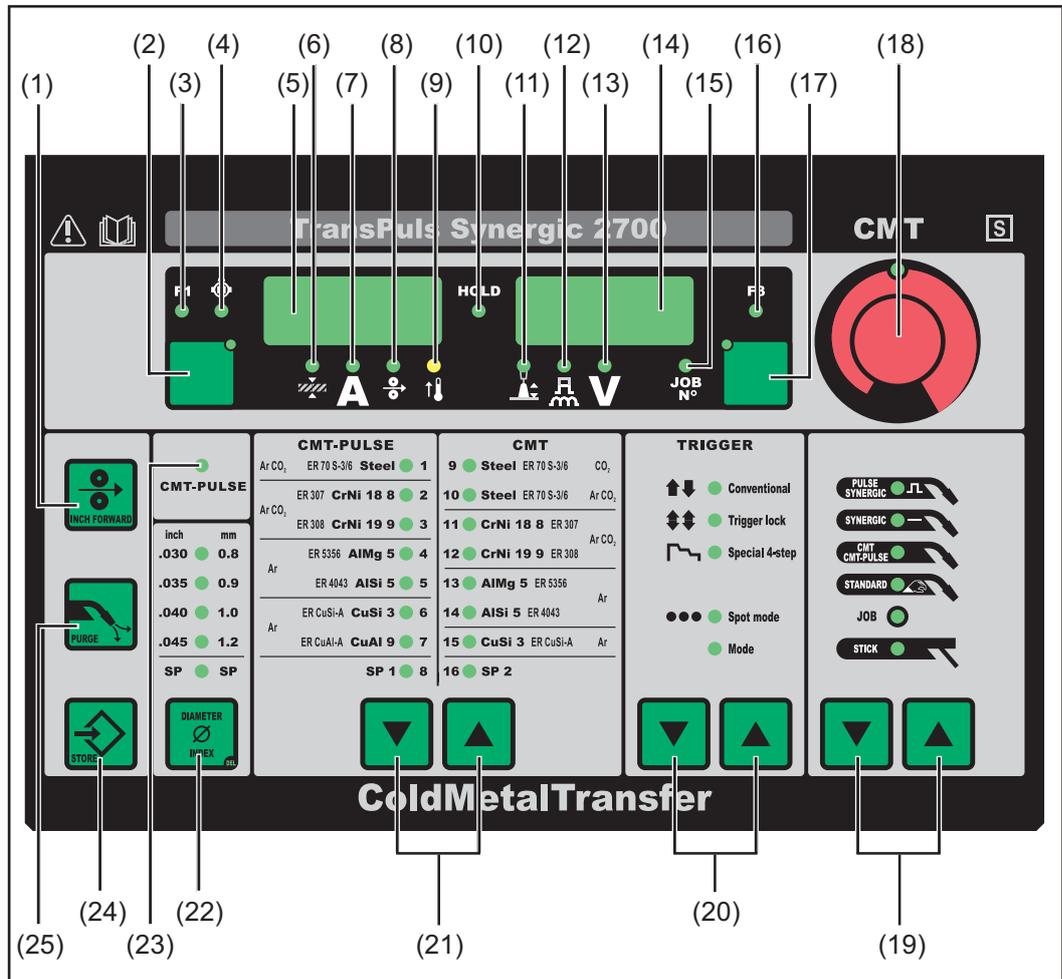
NOTE! The arc burning time indicator is not suitable as a basis for calculating hiring fees, guarantee, etc.



Press the Store button to exit.

CMT control panel

CMT control panel



No.	Function
(1)	Inch Forward (feeder inching) button for feeding the wire electrode into the torch-hosepack with no accompanying flow of gas or current
(2)	Parameter selection button for selecting the following parameters:
	<ul style="list-style-type: none">  Sheet thickness¹⁾ Sheet thickness in mm or in.  Welding current¹⁾ Welding current in A Before the start of welding, the machine automatically displays a standard value based on the programmed parameters. During welding, the actual value is displayed.  Wire feed speed¹⁾ Wire feed speed in m/min or ipm.

(1) **Inch Forward (feeder inching) button**
for feeding the wire electrode into the torch-hosepack with no accompanying flow of gas or current

For information on the various wire feed sequences that are possible when the welder presses and holds the "Feeder inching" button, see the Fdi parameter in the Setup menu.

(2) **Parameter selection button**
for selecting the following parameters:



Sheet thickness¹⁾

Sheet thickness in mm or in.



Welding current¹⁾

Welding current in A

Before the start of welding, the machine automatically displays a standard value based on the programmed parameters. During welding, the actual value is displayed.



Wire feed speed¹⁾

Wire feed speed in m/min or ipm.

No.	Function
 F1 indicator	indicates that the PushPull drive is switched on
 Wire-feed unit drive current-input indicator	indicates that the wire-feed unit drive is switched on
<p>If the indicators are lit up on the parameter selection button (3) and on the adjusting dial (19), then the indicated / selected parameter can be altered using the adjusting dial (19).</p> <p>1) The synergic function means that if one of these parameters is selected during MIG/MAG pulse synergic welding or MIG/MAG standard synergic welding, then all other parameters including the welding voltage parameter are automatically set as well.</p>	
(3) F1 indicator LED	lights up when the F1 indicator parameter is selected
(4) Wire-feed unit drive current-input indicator LED	lights up when the wire-feed unit drive current-input indicator parameter is selected
(5) Left digital display	
(6) Sheet thickness LED	lights up when the sheet thickness parameter is selected
(7) Welding current LED	lights up when the welding current parameter is selected
(8) Wire feed speed LED	lights up when the wire feed speed parameter is selected
(9) Overtemperature indicator	lights up if the power source overheats (e.g. because the duty cycle has been exceeded). For more information on this, see the "Troubleshooting" section.
(10) HOLD indicator	every time a welding operation finishes, the actual values for welding current and welding voltage are stored, and the HOLD indicator lights up.
(11) Arc length correction LED	lights up when the arc length correction parameter is selected
(12) Droplet detachment correction/arc force dynamic correction/arc force dynamic LED	lights up when the Droplet detachment correction/arc force dynamic correction/arc force dynamic parameter is selected
(13) Welding voltage LED	lights up when the welding voltage parameter is selected
(14) Right digital display	
(15) Job no. LED	lights up when the job number parameter is selected
(16) F3 indicator LED	lights up when the F3 indicator parameter is selected

No.	Function
(17)	<p>Parameter selection button for selecting the following parameters:</p> <p> Arc length correction for correcting the arc length</p> <p> Droplet detachment correction/arc force dynamic correction/arc force dynamic has a different function assigned to it, depending on the process being used. A description of the various functions can be found in the Welding chapter under the corresponding process.</p> <p> Welding voltage Welding voltage in V Before the start of welding, the machine automatically displays a standard value based on the programmed parameters. During welding, the actual value is displayed.</p> <p> Job N° In the job mode process for retrieving parameter records stored under job numbers</p> <p> F3 indicator indicates the real energy inputs in KJ. The real energy input must be activated in level 2 of the Setup menu – parameter EnE. If the indicator is not activated, the coolant flow is displayed when the coolant device FK 4000 Rob is available.</p> <p>If the indicators are lit up on the parameter selection button (17) and on the adjusting dial (18), then the indicated / selected parameter can be altered using the adjusting dial (18).</p>
(18)	<p>Adjusting dial for altering welding parameters. If the indicator on the adjusting dial is lit up, then the selected parameter is one that can be altered.</p>
(19)	<p>Process button(s) for selecting the welding process</p> <p> MIG/MAG pulse synergic welding</p> <p> MIG/MAG standard synergic welding</p> <p> CMT, CMT pulse</p> <p> MIG/MAG standard manual welding</p> <p> Job mode</p> <p> Manual metal arc welding</p> <p>When a process is selected, the LED on the relevant symbol lights up.</p>
(20)	<p>Mode button for selecting the mode</p> <p> 2-step mode</p> <p> 4-step mode</p> <p> Special 4-step mode (aluminium welding start-up)</p> <p> Spot welding mode</p> <p> Operating mode</p> <p>When a mode is selected, the LED behind the relevant symbol lights up.</p>

No.	Function
(21)	<p>Material button for selecting the filler metal and shielding gas to be used. Parameters SP1 and SP2 are reserved for additional materials.</p> <p>When a material is selected, the LED behind the relevant filler metal lights up.</p>
(22)	<p>Diameter / Index (wire diameter) button for selecting the diameter of the wire to be used. Parameter SP is reserved for additional wire diameters.</p> <p>When a wire diameter is selected, the LED behind the relevant wire diameter lights up.</p>
(23)	<p>CMT Pulse indicator lights up when a CMT/pulse characteristic is selected</p>
(24)	<p>Store button for opening the Setup menu</p>
(25)	<p>Purge (Gas test) button for setting the required gas flow rate on the pressure regulator. Gas will flow out for 30 s after pressing the gas test button. Press the button again to stop the gas test flow before the end of this period.</p>

Key combinations - special functions

The following special functions can be called by pressing buttons simultaneously or repeatedly.

Displaying the feeder inching speed



The set feeder inching speed is shown (e.g.: Fdi | 10 m/min or Fdi | 393.70 ipm).



Use the adjusting dial to change the feeder inching speed



Press the Store button to exit.

Displaying the gas pre-flow and gas post-flow time



The set gas pre-flow time is displayed (e.g. GPr | 0.1 s)



Use the adjusting dial to change the gas pre-flow time



Then press the Process button (20) to display the gas post-flow time setting (e.g. GPo | 0.5 s)



Use the adjusting dial to change the gas post-flow time



Press the Store button to exit.

Displaying the software version

In addition to the software version, these special functions can also be used to display the version number of the welding database, the wire-feed unit number, the software version of the wire-feed unit and the arc burning time.



The software version is displayed



Press the Material button (24) to display the version number of the welding database (e.g.: 0 | 029 = M0029).



Press the Material button (24) again to display the number of the wire-feed unit (A or B in the case of twin-head mounts) and the software version of the wire-feed unit (e.g.: A 1.5 | 0.23).



Press the Material button (24) a third time to display the actual arc burning time since starting for the first time (e.g. "654 | 32.1" = 65,432.1 h = 65,432 h, 6 min)



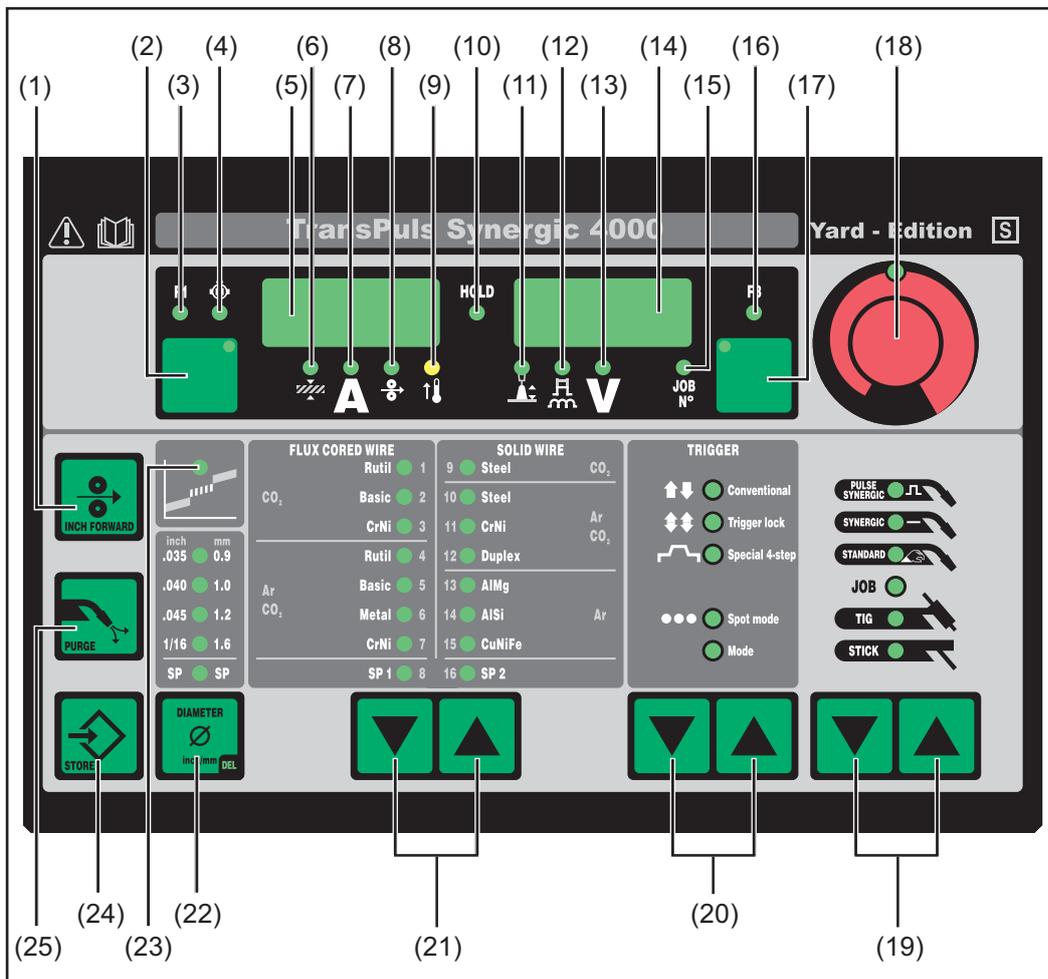
NOTE! The arc burning time indicator is not suitable as a basis for calculating hiring fees, guarantee, etc.



Press the Store button to exit.

Yard control panel

Yard control panel



No.	Function
(1)	Inch Forward (feeder inching) button for feeding the wire electrode into the torch-hosepack with no accompanying flow of gas or current
<p>For information on the various wire feed sequences that are possible when the welder presses and holds the "Feeder inching" button, see the Fdi parameter in the Setup menu.</p>	

No.	Function
(2)	<p>Parameter selection button for selecting the following parameters:</p> <p> Sheet thickness¹⁾ Sheet thickness in mm or in.</p> <p> Welding current¹⁾ Welding current in A Before the start of welding, the machine automatically displays a standard value based on the programmed parameters. During welding, the actual value is displayed.</p> <p> Wire feed speed¹⁾ Wire feed speed in m/min or ipm.</p> <p> F1 indicator indicates that the PushPull drive is switched on</p> <p> Wire-feed unit drive current-input indicator indicates that the wire-feed unit drive is switched on</p> <p>If the indicators are lit up on the parameter selection button (2) and on the adjusting dial (18), then the indicated / selected parameter can be altered using the adjusting dial (18).</p> <p>1) The synergic function means that if one of these parameters is selected during MIG/MAG pulse synergic welding or MIG/MAG standard synergic welding, then all other parameters including the welding voltage parameter are automatically set as well.</p>
(3)	<p>F1 indicator LED lights up when the F1 indicator parameter is selected</p>
(4)	<p>Wire-feed unit drive current-input indicator LED lights up when the wire-feed unit drive current-input indicator parameter is selected</p>
(5)	<p>Left digital display</p>
(6)	<p>Sheet thickness LED lights up when the sheet thickness parameter is selected</p>
(7)	<p>Welding current LED lights up when the welding current parameter is selected</p>
(8)	<p>Wire feed speed LED lights up when the wire feed speed parameter is selected</p>
(9)	<p>Overtemperature indicator lights up if the power source overheats (e.g. because the duty cycle has been exceeded). For more information on this, see the "Troubleshooting" section.</p>
(10)	<p>HOLD indicator every time a welding operation finishes, the actual values for welding current and welding voltage are stored, and the HOLD indicator lights up.</p>
(11)	<p>Arc length correction LED lights up when the arc length correction parameter is selected</p>
(12)	<p>Droplet detachment correction/arc force dynamic correction/arc force dynamic LED lights up when the Droplet detachment correction/arc force dynamic correction/arc force dynamic parameter is selected</p>

No.	Function
(13)	Welding voltage LED lights up when the welding voltage parameter is selected
(14)	Right digital display
(15)	Job no. LED lights up when the job number parameter is selected
(16)	F3 indicator LED lights up when the F3 indicator parameter is selected
(17)	Parameter selection button for selecting the following parameters: <ul style="list-style-type: none">  Arc length correction for correcting the arc length  Droplet detachment correction/arc force dynamic correction/arc force dynamic has a different function assigned to it, depending on the process being used. A description of the various functions can be found in the Welding chapter under the corresponding process.  Welding voltage Welding voltage in V Before the start of welding, the machine automatically displays a standard value based on the programmed parameters. During welding, the actual value is displayed.  Job N° In the job mode process for retrieving parameter records stored under job numbers  F3 indicator indicates the real energy inputs in KJ. The real energy input must be activated in level 2 of the Setup menu – parameter EnE. If the indicator is not activated, the coolant flow is displayed when the coolant device FK 4000 Rob is available. <p>If the indicators are lit up on the parameter selection button (17) and on the adjusting dial (18), then the indicated / selected parameter can be altered using the adjusting dial (18).</p>
(18)	Adjusting dial for altering welding parameters. If the indicator on the adjusting dial is lit up, then the selected parameter is one that can be altered.
(19)	Process button(s) for selecting the welding process <ul style="list-style-type: none">  PULSE MIG/MAG pulse synergic welding  SYNERGIC MIG/MAG standard synergic welding  STANDARD MIG/MAG standard manual welding  JOB Job mode  TIG TIG welding with touchdown ignition  STICK Manual metal arc welding <p>When a process is selected, the LED on the relevant symbol lights up.</p>

No.	Function
(20)	<p>Mode button for selecting the mode</p> <p> 2-step mode</p> <p> 4-step mode</p> <p> Special 4-step mode (aluminium welding start-up)</p> <p> Spot welding mode</p> <p> Operating mode</p> <p>When a mode is selected, the LED behind the relevant symbol lights up.</p>
(21)	<p>Material button for selecting the filler metal and shielding gas to be used. Parameters SP1 and SP2 are reserved for additional materials.</p> <p>When a material is selected, the LED behind the relevant filler metal lights up.</p>
(22)	<p>Diameter / Index (wire diameter) button for selecting the diameter of the wire to be used. Parameter SP is reserved for additional wire diameters.</p> <p>When a wire diameter is selected, the LED behind the relevant wire diameter lights up.</p>
(23)	<p>Intermediate arc indicator a spatter-prone intermediate arc occurs between the short arc and the spray arc. The intermediate arc indicator lights up to alert you to this critical area</p>
(24)	<p>Store button for opening the Setup menu</p>
(25)	<p>Purge (Gas test) button for setting the required gas flow rate on the pressure regulator. Gas will flow out for 30 s after pressing the gas test button. Press the button again to stop the gas test flow before the end of this period.</p>

Key combinations - special functions

The following special functions can be called by pressing buttons simultaneously or repeatedly.

Displaying the feeder inching speed



The set feeder inching speed is shown (e.g.: Fdi | 10 m/min or Fdi | 393.70 ipm).



Use the adjusting dial to change the feeder inching speed



Press the Store button to exit.

Displaying the gas pre-flow and gas post-flow time



The set gas pre-flow time is displayed (e.g. GPr | 0.1 s)



Use the adjusting dial to change the gas pre-flow time



Then press the Process button (20) to display the gas post-flow time setting (e.g. GPo | 0.5 s)



Use the adjusting dial to change the gas post-flow time



Press the Store button to exit.

Displaying the software version

In addition to the software version, these special functions can also be used to display the version number of the welding database, the wire-feed unit number, the software version of the wire-feed unit and the arc burning time.



The software version is displayed



Press the Material button (24) to display the version number of the welding database (e.g.: 0 | 029 = M0029).



Press the Material button (24) again to display the number of the wire-feed unit (A or B in the case of twin-head mounts) and the software version of the wire-feed unit (e.g.: A 1.5 | 0.23).



Press the Material button (24) a third time to display the actual arc burning time since starting for the first time (e.g. "654 | 32.1" = 65,432.1 h = 65,432 h, 6 min)



NOTE! The arc burning time indicator is not suitable as a basis for calculating hiring fees, guarantee, etc.



Press the Store button to exit.

“Remote” control panel

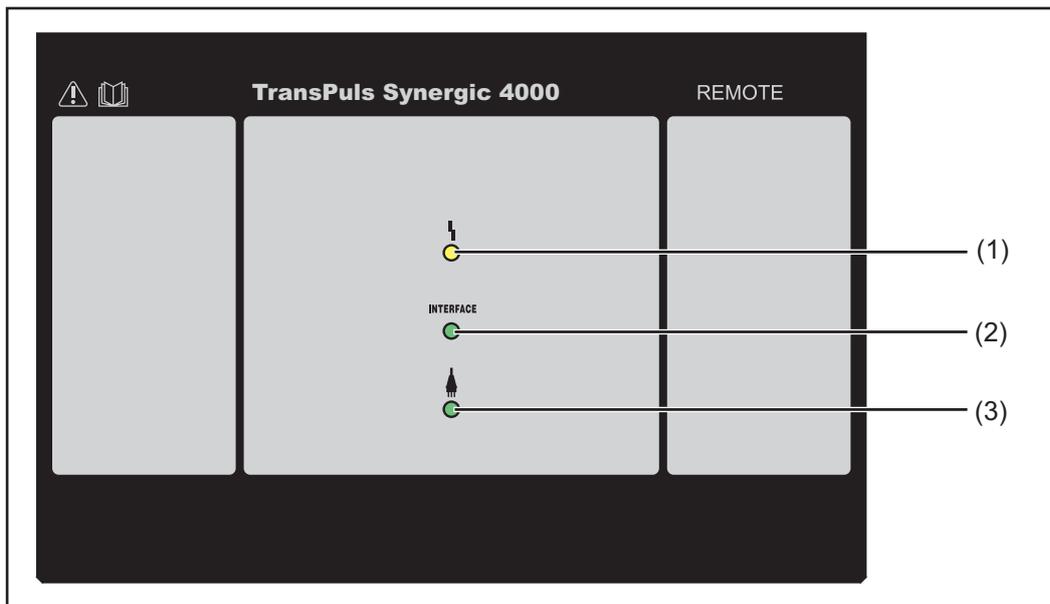
General

The Remote operating panel is fitted to the Remote power source. The Remote power source is designed for automated and robot applications and is controlled exclusively via the LocalNet.

The Remote power source can be operated via the following system add-ons:

- Remote controls
- Robot interfaces
- Field bus systems

Remote control panel



No.	Function
(1)	Error indicator lights up if an error has occurred. The corresponding error message is displayed on all devices connected to the LocalNet that have a digital display. The error messages displayed are described in the section headed “Troubleshooting”.
(2)	Robot interface indicator lights up when the power source is switched on and a robot interface or field bus system is connected to the LocalNet
(3)	Power source ON indicator lights up for as long as the mains cable is plugged in and the mains switch is in the “I” position

CMT Remote control panel

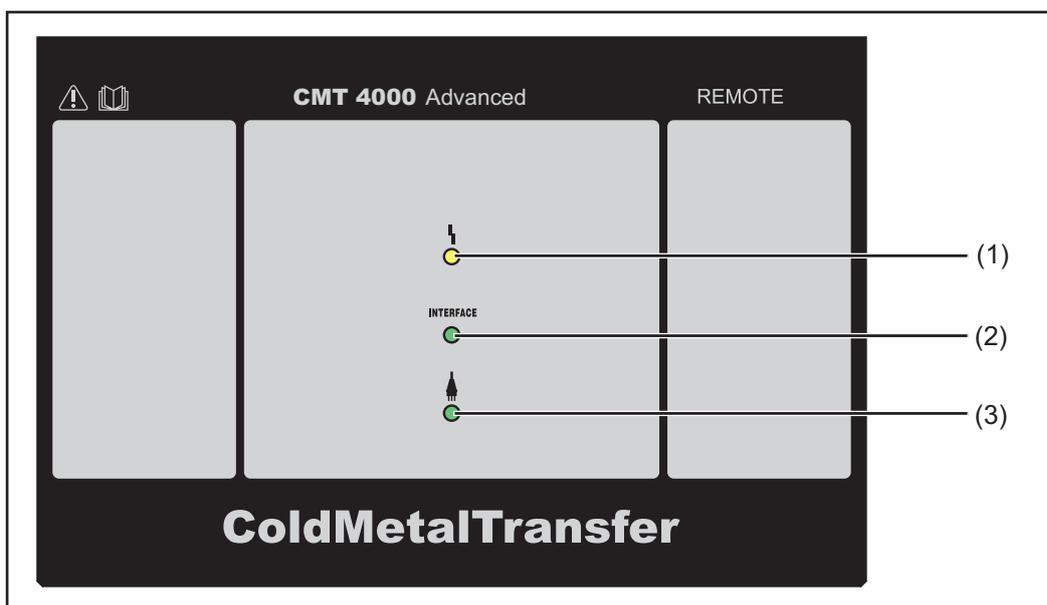
General

The CMT Remote control panel is fitted to the CMT Remote power source and CMT Advanced power source. The CMT Remote power source and CMT Advanced power source are designed for automated and robot applications and are controlled exclusively via the LocalNet.

The CMT Remote power source and CMT Advanced power source can be operated via the following system add-ons:

- RCU 5000i remote control
- ROB 5000 robot interface
- Field bus systems

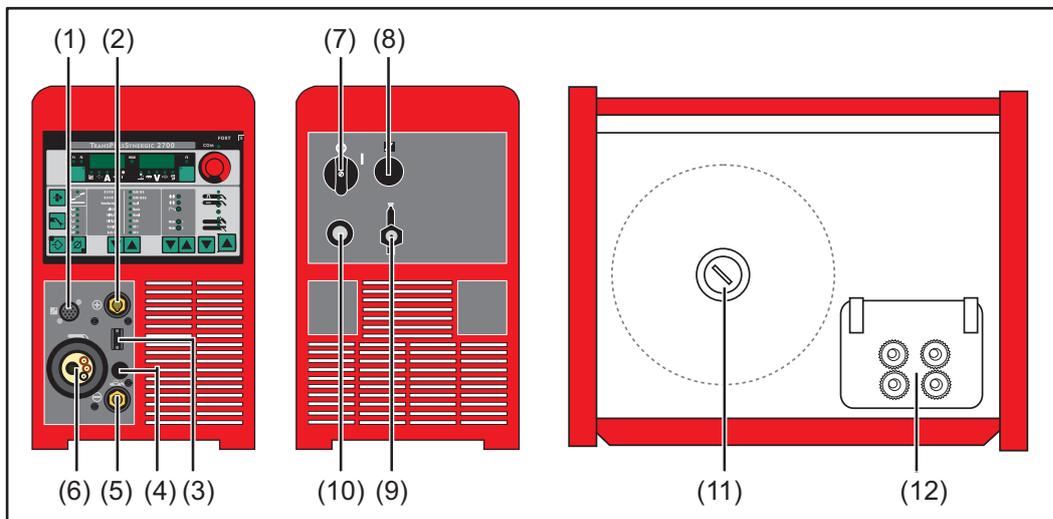
CMT Remote and CMT Advanced control panel



No.	Function
(1)	<p>Error indicator lights up if an error has occurred. The corresponding error message is displayed on all devices connected to the LocalNet that have a digital display.</p> <p>The error messages displayed are described in the section headed "Troubleshooting".</p>
(2)	<p>Robot interface indicator lights up when the power source is switched on and a robot interface or field bus system is connected to the LocalNet</p>
(3)	<p>Power source ON indicator lights up for as long as the mains cable is plugged in and the mains switch is in the "I" position</p>

Connections, switches and mechanical components

TPS 2700 power source

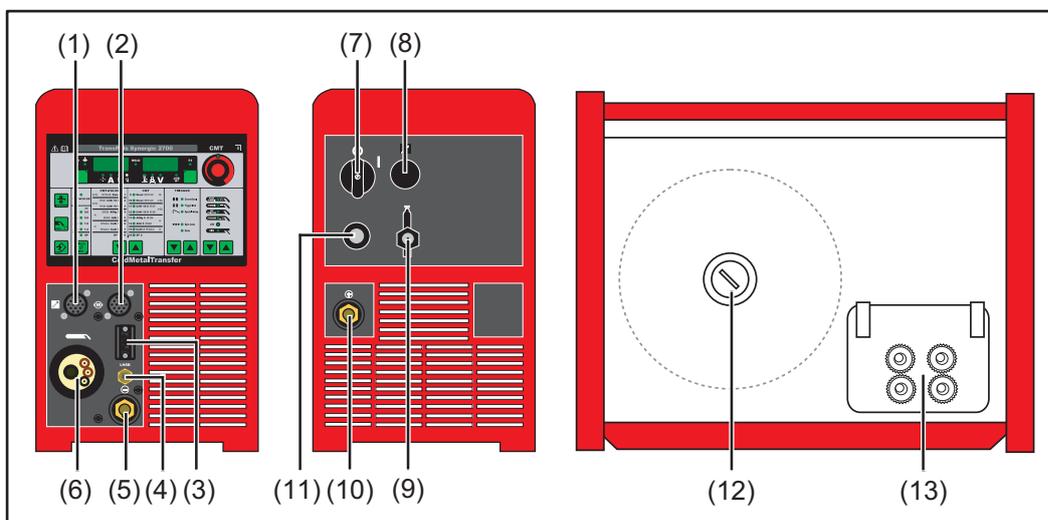


Front view / Rear view / Side view

No.	Function
(1)	LocalNet connection Standardised connection socket for system add-ons (e.g. remote control, Job-Master torch, etc.)
(2)	(+) - Current socket with bayonet latch for: <ul style="list-style-type: none"> - connecting the grounding (earthing) cable during TIG welding - connecting the electrode cable or grounding (earthing) cable during MMA welding (depending on the type of electrode used)
(3)	Welding torch control connection for the welding torch control plug
(4)	Blanking cover
(5)	(-) - Current socket with bayonet latch for: <ul style="list-style-type: none"> - connecting the grounding (earthing) cable during MIG/MAG welding - the current connection for the TIG welding torch - connecting the electrode cable or grounding (earthing) cable during MMA welding (depending on the type of electrode used)
(6)	Welding torch connection for connecting the welding torch
(7)	Mains switch for switching the power source on and off
(8)	Blanking cover reserved for a LocalNet connection
(9)	Shielding gas connection
(10)	Mains cable with strain relief device
(11)	Wirespool holder with brake for holding standard wirespools weighing up to 16 kg (35.27 lbs) and with a max. diameter of 300 mm (11.81 in)

No.	Function
(12)	4 roller drive

TPS 2700 CMT power source



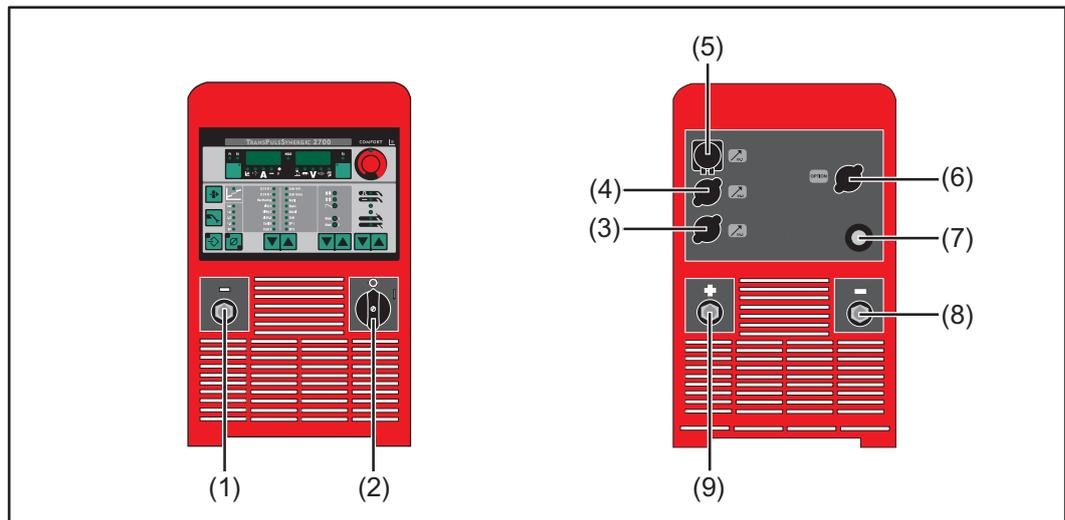
Front view / Rear view / Side view

No.	Function
-----	----------

- | | |
|------|--|
| (1) | LocalNet connection
Standardised connection socket for system add-ons (e.g. remote control, Job-Master torch, etc.) |
| (2) | Motor control connection
for connecting the control line from the CMT drive unit |
| (3) | Welding torch control connection
for the welding torch control plug |
| (4) | LHSB connection
for connecting the LHSB cable from the CMT drive unit (LHSB = LocalNet High-Speed Bus) |
| (5) | (-) - Current socket with bayonet latch
for: <ul style="list-style-type: none"> - connecting the grounding (earthing) cable during MIG/MAG welding - the current connection for the TIG welding torch - connecting the electrode cable or grounding (earthing) cable during MMA welding (depending on the type of electrode used) |
| (6) | Welding torch connection
for connecting the welding torch |
| (7) | Mains switch
for switching the power source on and off |
| (8) | Blanking cover
reserved for a LocalNet connection |
| (9) | Shielding gas connection |
| (10) | (+) - Current socket with bayonet latch
for: <ul style="list-style-type: none"> - connecting the grounding (earthing) cable during TIG welding - connecting the electrode cable or grounding (earthing) cable during MMA welding (depending on the type of electrode used) |

No.	Function
(11)	Mains cable with strain relief device
(12)	Wirespool holder with brake for holding standard wirespools weighing up to 16 kg (35.27 lbs) and with a max. diameter of 300 mm (11.81 in)
(13)	4 roller drive

**TS 4000 / 5000,
TPS 3200 / 4000 /
5000, TIME 5000**
Digital power
sources

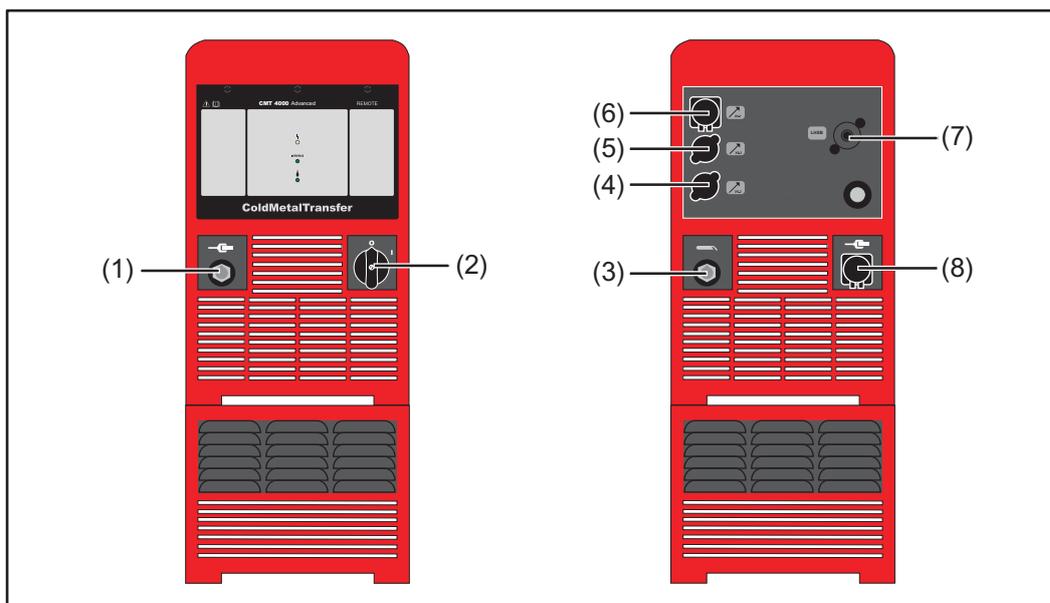


Front view / Rear view

No.	Function
(1)	(-) - Current socket with bayonet latch for: <ul style="list-style-type: none"> - connecting the grounding (earthing) cable during MIG/MAG welding - the current connection for the TIG welding torch - connecting the electrode cable or grounding (earthing) cable during MMA welding (depending on the type of electrode used)
(2)	Mains switch for switching the power source on and off
(3)	Blanking cover Reserved for LocalNet or LHSB (LocalNet High-Speed Bus) connection
(4)	Blanking cover Reserved for LocalNet or LHSB (LocalNet High-Speed Bus) connection
(5)	LocalNet connection for interconnecting hosepack
(6)	Blanking cover Reserved for LHSB (LocalNet High-Speed Bus) connection
	The LHSB connection is provided as standard with CMT power sources.
(7)	Mains cable with strain relief device

No.	Function
(8)	<p>Second (-) - Current socket with bayonet latch (optional) for:</p> <ul style="list-style-type: none"> - connecting the interconnecting hosepack in MIG/MAG welding for polarity reversal (e.g. for innershield and flux core wire welding) - specially for automated and robot applications where the interconnecting hosepack and grounding (earthing) cable are to be connected to one side of the power source (e.g. in a switch cabinet) <p>Second (+) - Current socket with bayonet latch (optional) for connecting a second current cable</p> <p>Blanking cover If the second (-) current socket with bayonet latch or second (+) current socket with bayonet latch options are not present on the power source.</p>
(9)	<p>(+) - Current socket with bayonet latch for:</p> <ul style="list-style-type: none"> - connecting the current cable from the interconnecting hosepack during MIG/MAG welding - connecting the grounding (earthing) cable during TIG welding - connecting the electrode cable or grounding (earthing) cable during MMA welding (depending on the type of electrode used)

**CMT 4000
Advanced power
source**



Front view / Rear view

No.	Function
(1)	<p>Grounding (earthing) cable connection for:</p> <ul style="list-style-type: none"> - connecting the grounding (earthing) cable in MIG/MAG welding, CMT welding and CMT Advanced welding - connecting the electrode cable or grounding (earthing) cable during MMA welding (depending on the type of electrode used)
(2)	<p>Mains switch for switching the power source on and off</p>

No.	Function
(3)	Current socket with bayonet latch for: <ul style="list-style-type: none"> - connecting the current cable of the interconnecting hosepack in MIG/MAG welding, CMT welding and CMT Advanced welding - connecting the electrode cable or grounding (earthing) cable during MMA welding (depending on the type of electrode used)
(4)	Blanking cover Reserved for LocalNet connection
(5)	Blanking cover Reserved for LocalNet connection
(6)	LocalNet connection for interconnecting hosepack
(7)	LHSB (LocalNet High-Speed Bus) connection
(8)	Mains cable with strain relief device

Installation and commissioning

Minimum equipment needed for welding task

General

Depending on which welding process you intend to use, a certain minimum equipment level will be needed in order to work with the power source. The welding processes and the minimum equipment levels required for the welding task are then described.

MIG/MAG gas-cooled welding

- Power source
- Grounding (earthing) cable
- MIG/MAG welding torch, gas-cooled
- Gas connection (shielding gas supply)
- Wire-feed unit (TS 4000 / 5000, TPS 3200 / 4000 / 5000 only)
- Interconnecting hosepack (TS 4000/5000, TPS 3200/4000/5000 only)
- Wire electrode

MIG/MAG water-cooled welding

- Power source
- Cooling unit
- Grounding (earthing) cable
- MIG/MAG welding torch, water-cooled
- Gas connection (shielding gas supply)
- Wire-feed unit (TS 4000 / 5000, TPS 3200 / 4000 / 5000 only)
- Interconnecting hosepack (TS 4000/5000, TPS 3200/4000/5000 only)
- Wire electrode

MIG/MAG automated welding

- Power source (TS 4000 / 5000, TPS 3200 / 4000 / 5000)
- Robot interface or field bus connection
- Grounding (earthing) cable
- MIG/MAG robot welding torch or MIG/MAG machine welding torch (a cooling unit is also required with water-cooled robot or machine welding torches)
- Gas connection (shielding gas supply)
- Wire-feed unit
- Interconnecting hosepack
- Wire electrode

CMT manual welding

- CMT power source
- Grounding (earthing) cable
- CMT welding torch with CMT drive unit and CMT wire buffer (a cooling unit is also required for water-cooled CMT applications)
- CMT wire-feed unit (TPS 3200 / 4000 / 5000 only)
- CMT interconnecting hosepack (TPS 3200 / 4000 / 5000 only)
- Wire electrode
- Gas connection (shielding gas supply)

-
- CMT automated welding**
- CMT power source: TPS 3200 / 4000 / 5000 (or CMT remote power source with RCU 5000i remote control)
 - Robot interface or field bus connection
 - Grounding (earthing) cable
 - CMT welding torch incl. CMT drive unit
 - Cooling unit
 - CMT wire-feed unit
 - CMT interconnecting hosepack
 - CMT wire buffer
 - Wire electrode
 - Gas connection (shielding gas supply)
-

- CMT Advanced welding**
- CMT 4000 Advanced power source
 - RCU 5000i remote control
 - Robot interface or field bus connection
 - Grounding (earthing) cable
 - CMT welding torch incl. CMT drive unit
 - Cooling unit
 - CMT wire-feed unit
 - CMT interconnecting hosepack
 - CMT wire buffer
 - Wire electrode
 - Gas connection (shielding gas supply)
-

- TIG DC welding**
- Power source
 - Grounding (earthing) cable
 - TIG gas valve welding torch
 - Gas connection (shielding gas supply)
 - Filler metal (depending on the application)
-

- Manual metal arc welding**
- Power source
 - Grounding (earthing) cable
 - Electrode holder
 - Rod electrodes

Before installation and commissioning

Safety

 **WARNING!**

Danger from incorrect operation.

Possible serious injury and damage to property.

- ▶ Do not use the functions described here until you have read and completely understood these Operating Instructions.
 - ▶ Do not use the functions described here until you have fully read and understood all of the Operating Instructions for the system components, in particular the safety rules!
-

Proper use

The power source may only be used for MIG/MAG, MMA and TIG welding. Any use above and beyond this purpose is deemed improper. The manufacturer shall not be held liable for any damage arising from such usage.

Proper use also includes:

- following all the information in the operating instructions
 - carrying out all the specified inspection and servicing work
-

Setup regulations

The device is tested to IP 23 protection, meaning:

- protection against penetration by solid foreign bodies with diameters > 12.5 mm (0.49 in.)
- protection against direct sprays of water at any angle up to 60° from the vertical

The device can be set up and operated outdoors in accordance with IP23. Avoid direct wetting (e.g. from rain).

 **WARNING!**

If one of these devices topples over or falls it could cause serious or even fatal injury.

- ▶ Place devices, upright consoles and trolleys on a solid, level surface in such a way that they remain stable.
-

The venting duct is a very important safety feature. When choosing the installation location, ensure that the cooling air can enter and exit unhindered through the air ducts on the front and back of the device. Any electroconductive metallic dust (e.g. from grinding work) must not be allowed to get sucked into the device.

Mains connection

The devices are designed to run at the mains voltage specified on the rating plate. If your version of the device does not come with mains cables and plugs ready-fitted, these must be fitted in accordance with national regulations and standards. For details of fuse protection of the mains lead, please see the Technical Data.

NOTE!

Inadequately dimensioned electrical installations can cause serious damage.

The mains lead and its fuse must be dimensioned to suit the local power supply. The technical data shown on the rating plate applies.

Applies to TIME 5000 Digital power source:

The standard mains plug allows the user to operate with a mains voltage of up to 400 V.

For mains voltages up to 460 V, fit an approved mains plug or install the mains supply directly.

Connecting up the mains cable on US power sources

General

The US power sources are supplied without a mains cable. A mains cable appropriate for the connection voltage must be fitted prior to commissioning. A strain-relief device for a cable cross-section AWG 10 is installed on the power source. Strain-relief devices for larger cable cross-sections must be designed accordingly.

Stipulated mains cables and strain-relief devices

Power source	Mains voltage	Cable cross-section
TS 4000 / 5000, TPS 4000 / 5000, CMT 4000 Advanced	3 x 460 V 3 x 230 V	AWG 10 AWG 6
TPS 3200	3 x 460 V 3 x 230 V	AWG 10 AWG 8

AWG ... **A**merican **W**ire **G**auge

Safety

WARNING!

Danger due to work that has been carried out incorrectly.

This can result in serious injury and damage to property.

- ▶ The work described below must only be carried out by trained and qualified personnel.
- ▶ Observe national standards and directives.

CAUTION!

Danger due to improperly prepared mains cable.

This can cause short circuits and damage.

- ▶ Fit ferrules to all phase conductors and the ground conductor of the stripped mains cable.

Connecting the mains cable

- 1 Remove the left side panel of the power source
- 2 Strip about 100 mm (4 in.) of insulation from the end of the mains cable

NOTE!

The ground conductor (green, or green with yellow stripes) should be approx. 10 - 15 mm (0.4 - 0.6 in.) longer than the phase conductors.

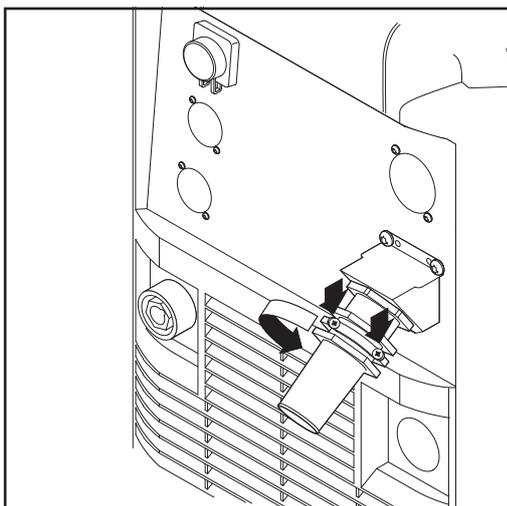
- 3 Fit ferrules to phase conductors and the ground conductor of the mains cable; crimp ferrules with pliers

CAUTION!

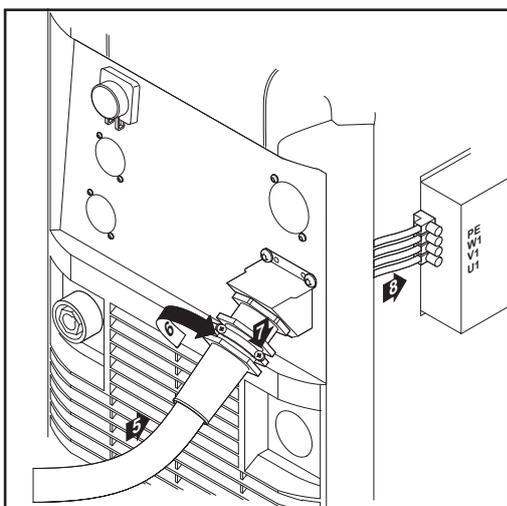
Risk of short circuits!

If ferrules are not used, there is a risk of short circuits between the phase conductors or between phase conductors and the ground conductor.

- Fit ferrules to all phase conductors and the ground conductor of the stripped mains cable.



- 4 Undo the screws (2 x) and clamping nut (size 30) on the strain-relief device



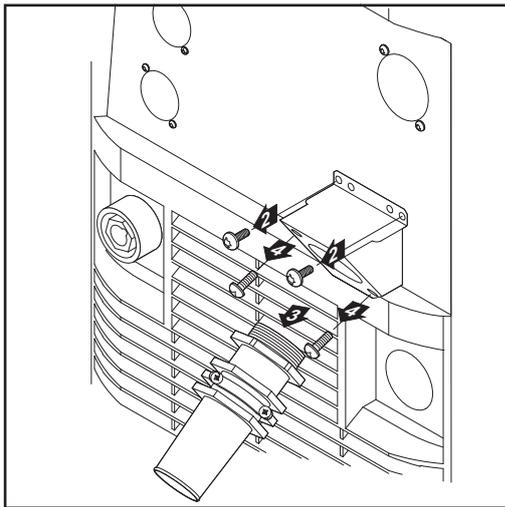
- 5 Insert the mains cable into the strain-relief device

NOTE!

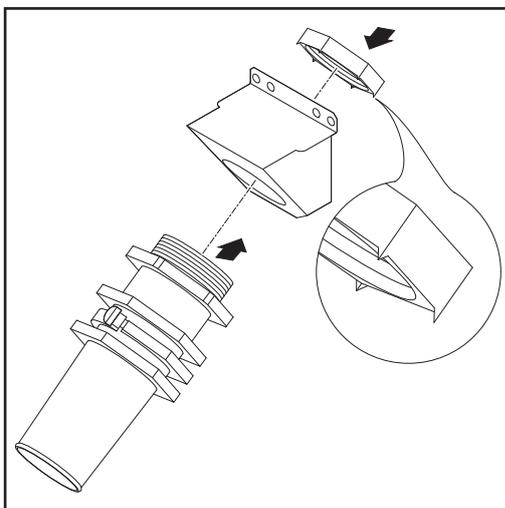
Push the mains cable in far enough to make it possible to connect the ground conductor and the phase conductors to the block terminal properly.

- 6 Tighten the clamping nut (size 30 mm)
- 7 Tighten the screws (2 x)
- 8 Connect the mains cable to the block terminal correctly:
- Ground conductor (green, or green with yellow stripes) to the PE connection
 - Phase conductors to connections L1 - L3
- 9 Re-fit the left side panel of the power source

Replacing the strain-relief device



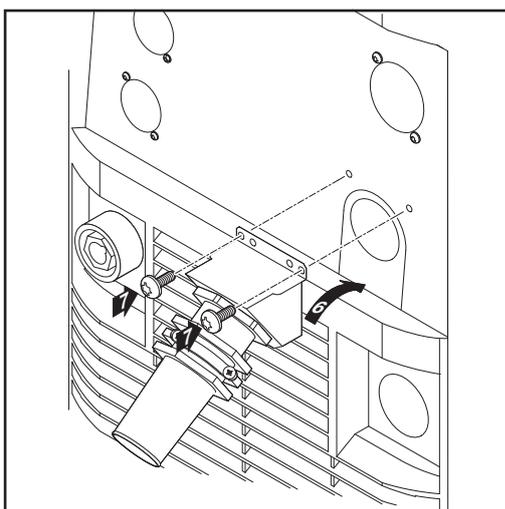
- 1 Remove the left side panel of the power source
- 2 Remove the screws (2 x) from the existing strain-relief device
- 3 Pull the existing strain-relief device forwards to detach it
- 4 Remove the screws for the adapter plate, and remove the adapter plate



- 5 Insert the hexagon nut (size 50 mm) into the holding plate

NOTE!

To ensure a reliable earth connection to the housing of the power source, the points on the hexagon nut must be facing the holding plate.



- 6 Screw the front of the large strain-relief device into the hexagon nut (size 50 mm). The hexagon nut (size 50 mm) now bites into the holding plate.
- 7 Slot the large strain-relief device into the housing and fasten it with 2 screws
- 8 Connect the mains cable
- 9 Re-fit the left side panel of the power source

Start-up

Safety



WARNING!

An electric shock can be fatal.

If the power source is connected to the mains electricity supply during installation, there is a high risk of very serious injury and damage.

- ▶ Before carrying out any work on the device make sure that the power source mains switch is in the "O" position
 - ▶ Before carrying out any work on the device make sure that the power source is unplugged from the mains
-



WARNING!

Danger from electrical current due to electrically conductive dust in the device.

This can result in serious injury and damage to property.

- ▶ Only operate the device with an air filter fitted. The air filter is a very important safety device for adhering to the IP 23 protection class.
-

Remarks on the cooling unit

We recommend using an FK 4000 R cooling unit for the following applications and situations:

- TS 4000 / 5000, TPS 3200 / 4000 / 5000 power sources
- JobMaster welding torch
- Push-pull welding torch
- Robot welding
- Hosepacks over 5 m long
- MIG/MAG pulse synergic welding
- In general, where welding is performed in higher power ranges

The cooling unit is powered from the power source. The cooling unit is ready for operation when the mains switch of the power source is in the - I - position.

More information on the cooling unit can be found in the operating instructions for the cooling unit.

Information on system components

The steps and activities described below include references to various system components, including:

- Trolleys
- Cooling units
- Wire-feed unit holders
- Wire-feed units
- Interconnecting hosepacks
- Welding torches
- etc.

For more detailed information about installing and connecting the system components, please refer to the appropriate operating instructions.

Overview

"Commissioning" is composed of the following sections:

- Commissioning the TPS 2700
- Commissioning the TS 4000/5000, TPS 3200/4000/5000
- Commissioning the CMT 4000 Advanced

Commissioning the TPS 2700

General

Commissioning the TPS 2700 power source is described by reference to a manual gas-cooled MIG/MAG application.

Recommendation for water-cooled applications

- Use the PickUp trolley
- Fit the cooling unit to the PickUp trolley
- Fit the TPS 2700 power supply to the cooling unit
- Only use water-cooled welding torches with an external water connection
- Connect the water connections on the welding torch directly to the cooling unit

Connecting the gas cylinder

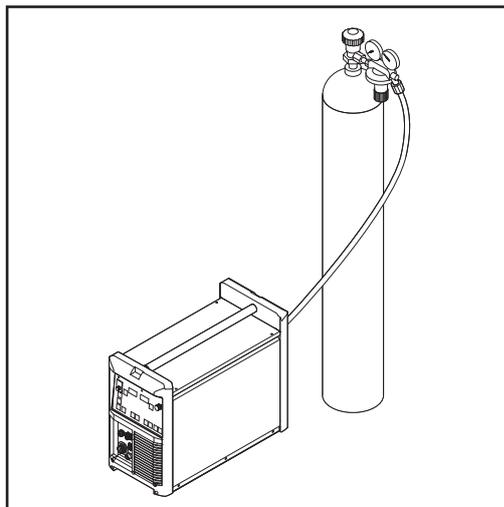


WARNING!

If gas cylinders topple over, there is a risk of very serious injury and damage.

Place gas cylinders on a solid, level surface so that they remain stable. Secure gas cylinders to prevent them from falling over.

Observe the safety rules of the gas cylinder manufacturer.



Connecting the gas hose to the TPS 2700

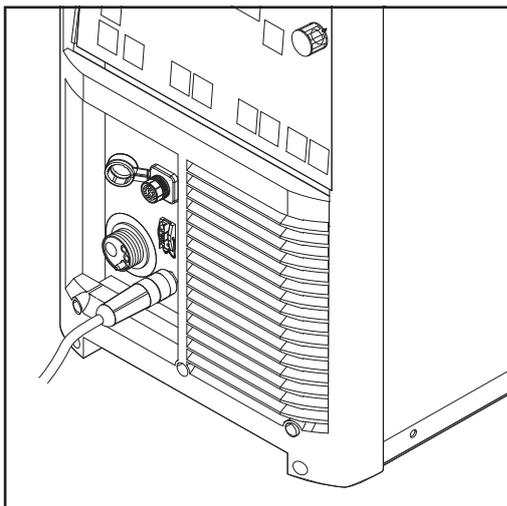
- 1 Place the gas cylinder on a solid, level surface in such a way that it remains stable
- 2 Secure the gas cylinder to prevent it from toppling over (but not around the neck of the cylinder)
- 3 Take the protective cap off the gas cylinder
- 4 Briefly open the gas cylinder valve to blow off any dust or dirt
- 5 Check the seal on the pressure regulator
- 6 Screw the pressure regulator onto the gas cylinder and tighten it
- 7 Connect the pressure regulator to the shielding gas connection on the power source using the gas hose

NOTE!

US devices are supplied with an adapter for the gas hose:

- ▶ Glue in or seal the adapter
- ▶ Test the adapter to ensure that it is gas tight.

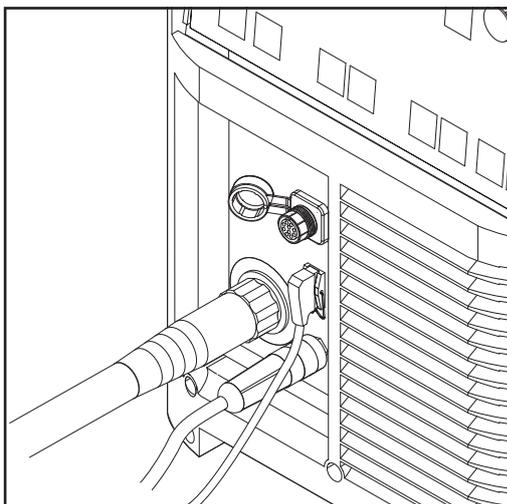
Establishing a ground (earth) connection



Connecting the grounding (earthing) cable to the TPS 2700

- 1 Plug the grounding (earthing) cable into the (-) current socket and twist to fasten it
- 2 Use the other end of the grounding (earthing) cable to establish a connection to the workpiece

Connecting the welding torch



Connecting the welding torch to the TPS 2700

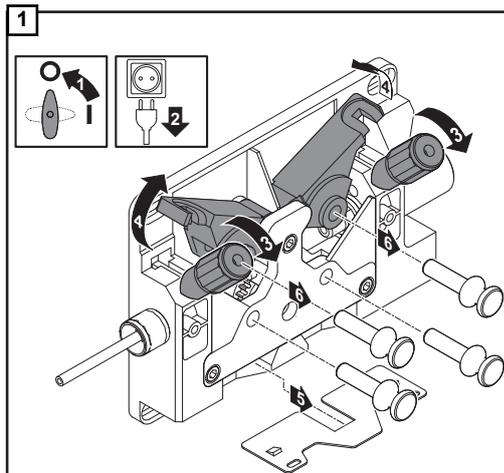
- 1 Check that the torch is correctly and completely tooled up. Insert it - infeed tube first - into the torch connection
- 2 Tighten the union nut by hand to fix the torch in place
- 3 Plug the control plug of the welding torch into the torch control connection and latch it in place

NOTE!

When altering the length and/or cross-section of the welding torch hosepack, measure the welding circuit resistance r and the welding circuit inductivity L (see "Further settings").

Inserting/replacing feed rollers

In order to achieve optimum wire electrode feed, the feed rollers must be suitable for the diameter and alloy of the wire being welded.

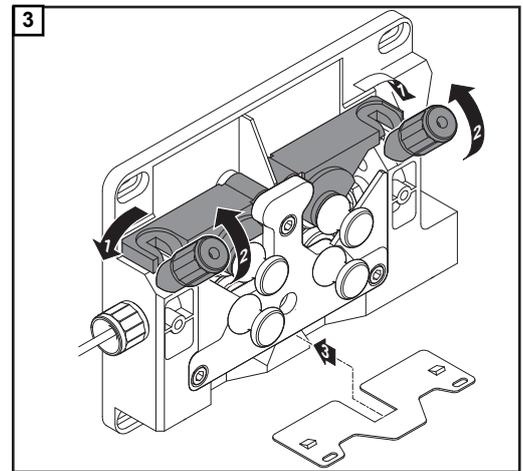
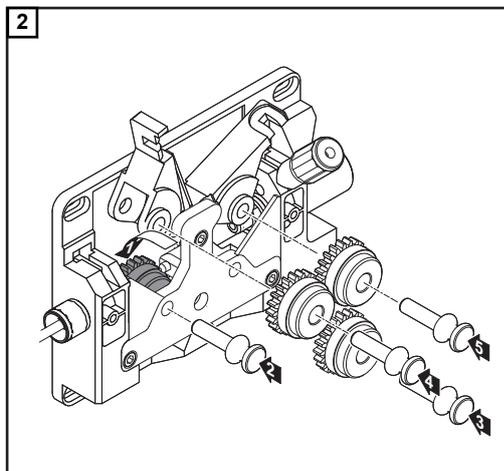


NOTE!

Only use feed rollers that match the wire electrode.

An overview of the feed rollers available and their possible areas of use can be found in the spare parts lists.

US devices are supplied without feed rollers. After inserting the wirespool, insert the feed rollers.



Inserting the wirespool

⚠ CAUTION!

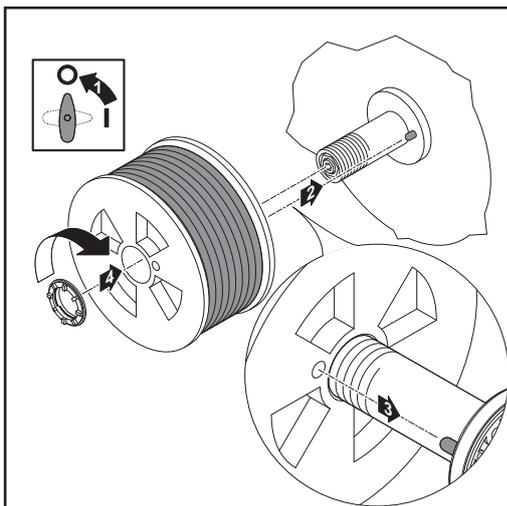
Risk of injury from springiness of spooled wire electrode.

While inserting the wirespool, hold the end of the wire electrode firmly to avoid injuries caused by the wire springing back.

⚠ CAUTION!

Risk of injury from falling wirespool.

Make sure the wirespool sits securely on the spool holder.



Inserting the basket-type spool

⚠ CAUTION!

Risk of injury from springiness of spooled wire electrode.

While inserting the wirespool, hold the end of the wire electrode firmly to avoid injuries caused by the wire springing back.

⚠ CAUTION!

Risk of injury from falling wirespool.

Make sure the wirespool sits securely on the spool holder.

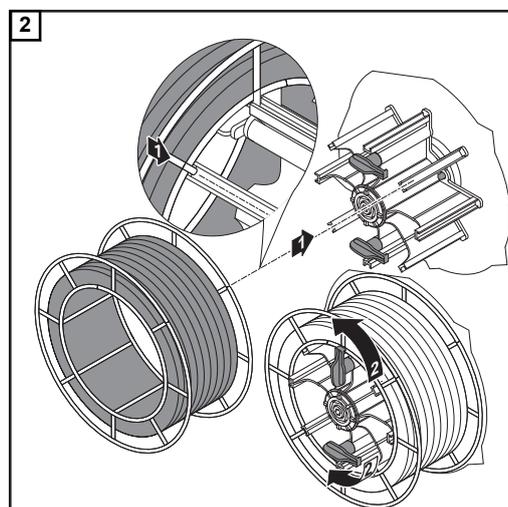
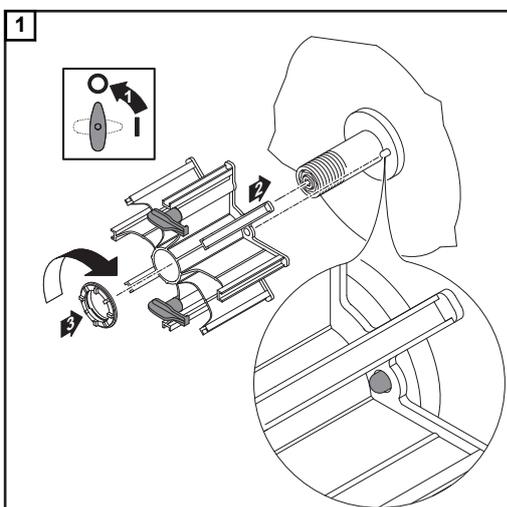
NOTE!

When working with basket-type spools, only use the basket-type spool adapter supplied with the device.

⚠ CAUTION!

Risk of injury from falling basket-type spool.

Place the basket-type spool on the adapter provided in such a way that the bars on the spool are inside the adapter guideways.



Feeding in the wire electrode

CAUTION!

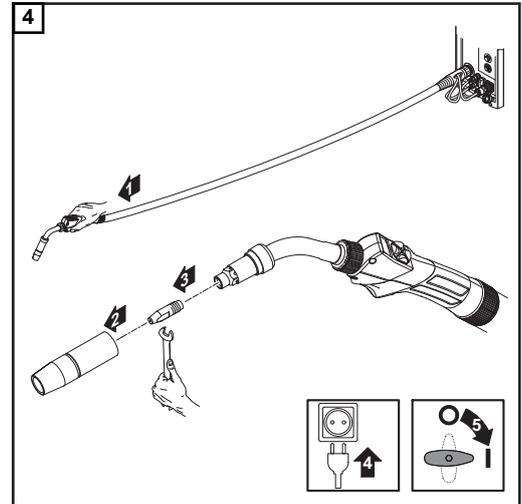
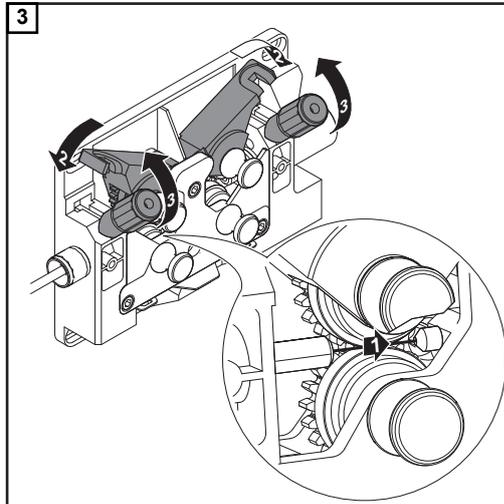
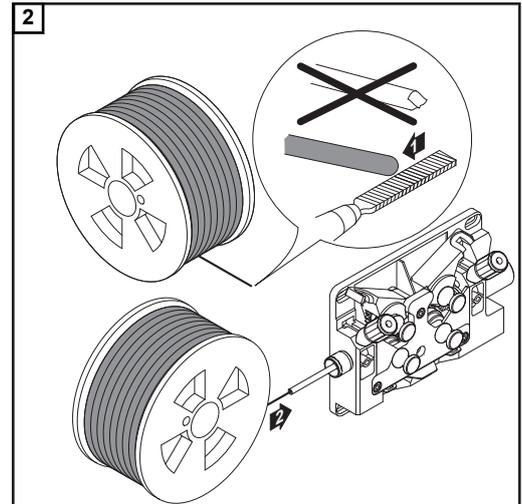
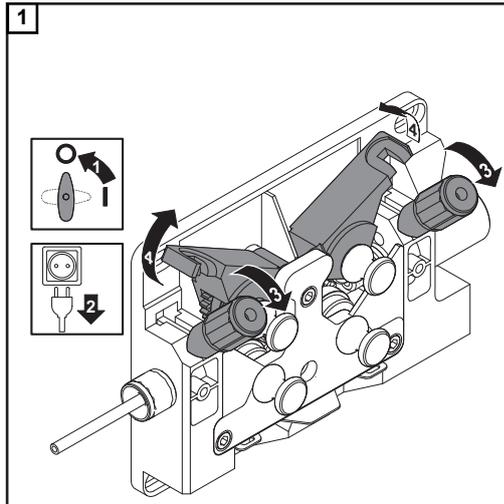
Risk of injury from springiness of spooled wire electrode.

When inserting the wire electrode into the 4-roller drive, hold the end of the wire electrode firmly to avoid injuries caused by the wire springing back.

CAUTION!

Risk of damage to the welding torch from sharp end of wire electrode.

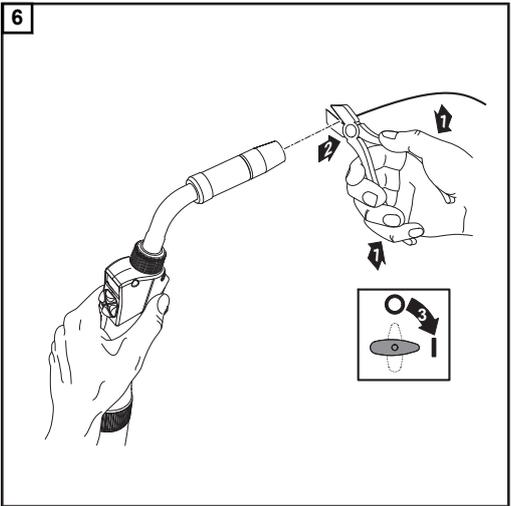
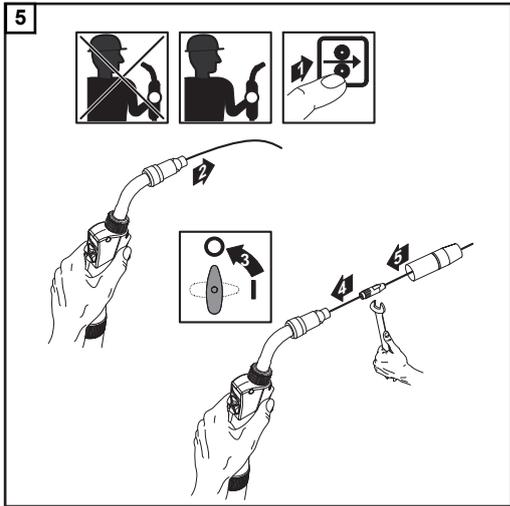
Deburr the end of the wire electrode well before feeding in.



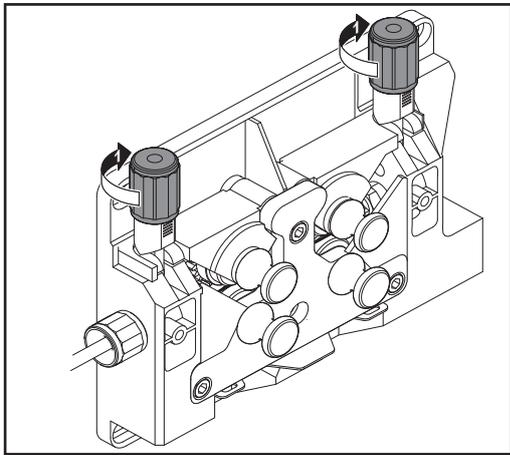
CAUTION!

Risk of injury from wire electrode emerging at speed.

Keep the welding torch away from face and body when pressing the feeder inching / inch forward button.



Setting the contact pressure

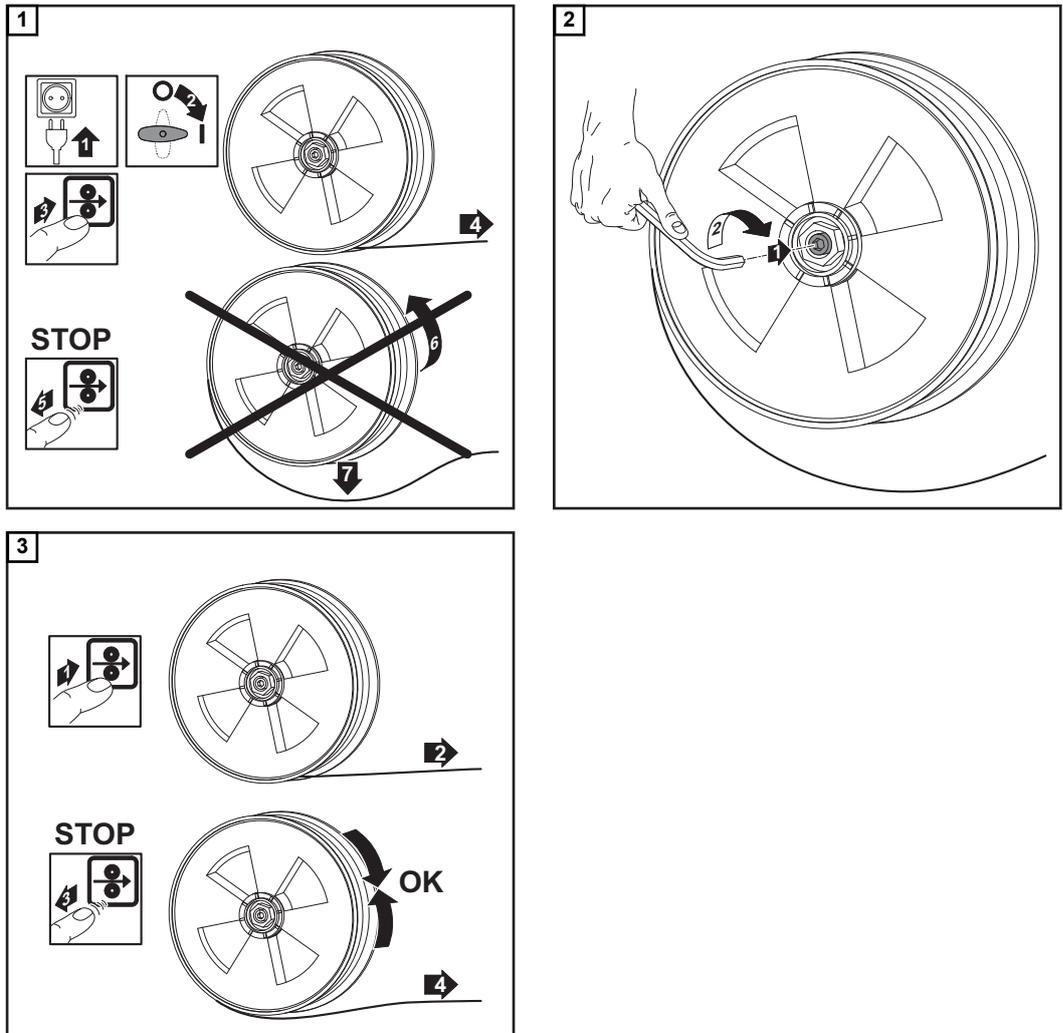


NOTE!
 Set the contact pressure in such a way that the wire electrode is not deformed but nevertheless ensures that the wire is transported properly.

Contact pressure standard values	Semi-cylindrical rolls	Trapeze rolls	Plastic rolls
Aluminium	1.5	-	3.5 - 4.5
Steel	3 - 4	1.5	-
CrNi	3 - 4	1.5	-

Adjusting the brake

NOTE!
 After releasing the torch trigger the wirespool should stop unreeling. Adjust brake if necessary.

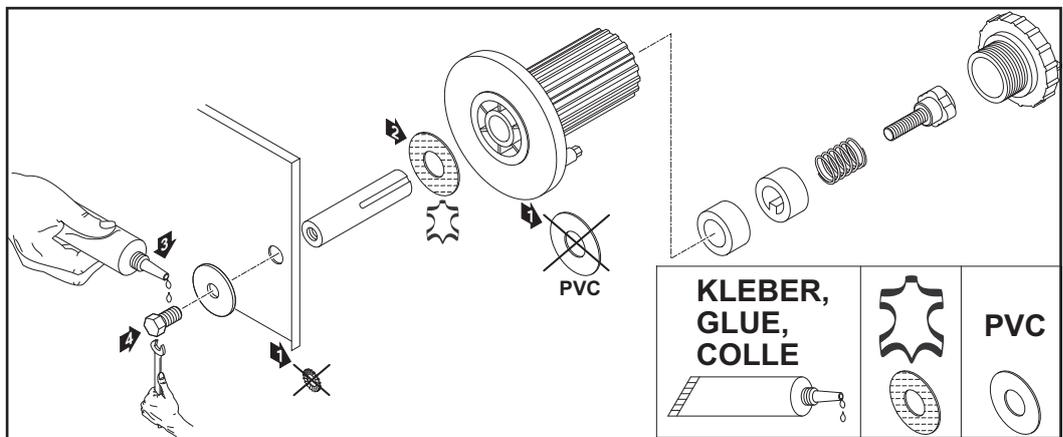


Design of the brake

⚠ CAUTION!

Risk of injury and damage from falling wirespool.

To ensure that the wirespool is properly in place and that the brake works properly, fit the brake according to the following diagram.



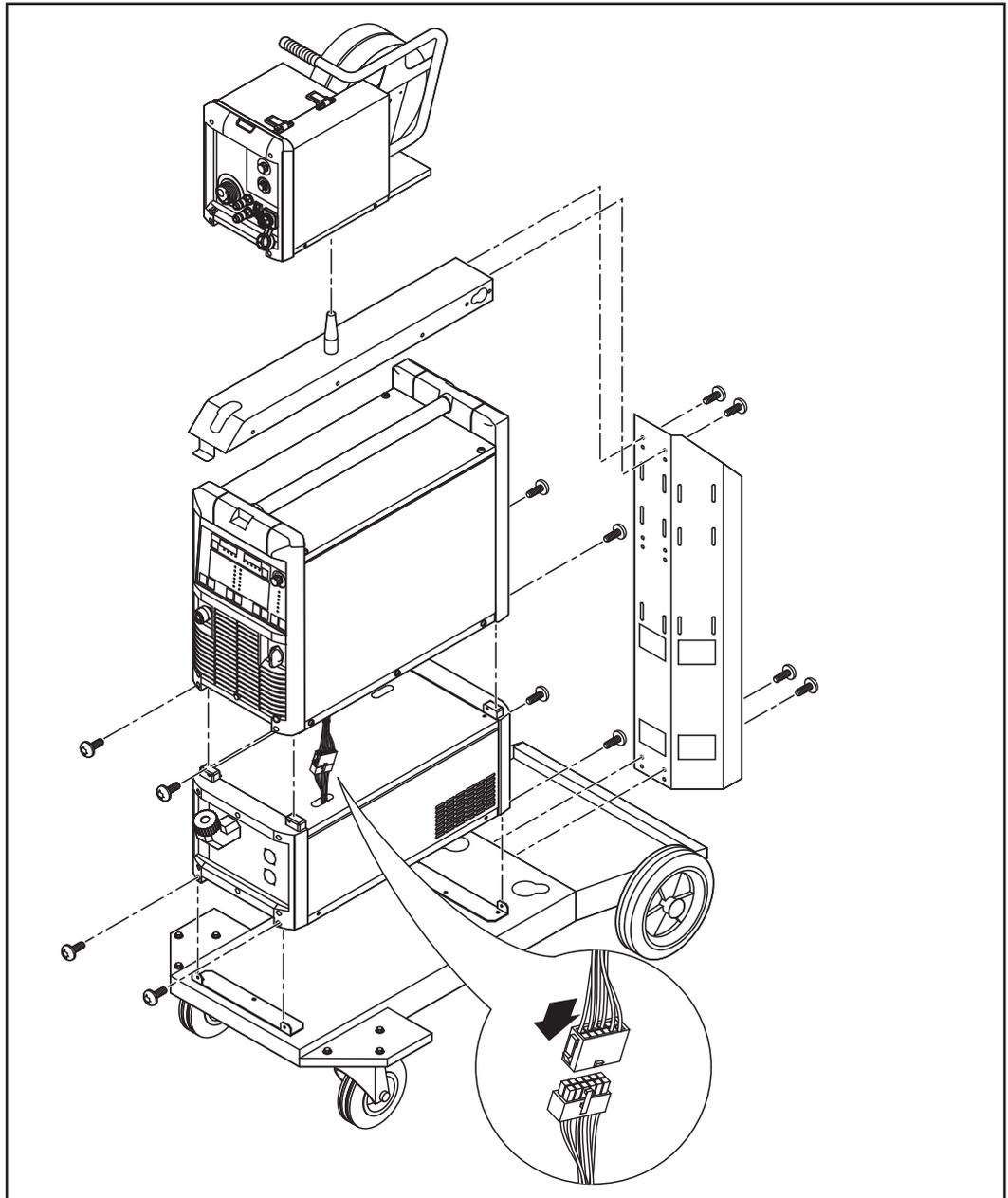
Commissioning the TS 4000 / 5000, TPS 3200 / 4000 / 5000, TIME 5000 Digital

General

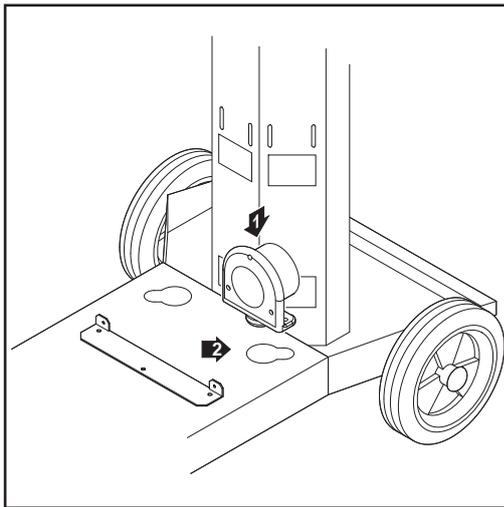
Commissioning the TS 4000 / 5000 and TPS 3200 / 4000 / 5000 power sources is described by reference to a manual water-cooled MIG/MAG application.

Fitting the system components (overview)

The diagram below is intended to show you how to fit the individual system components. For detailed information about the individual steps, please refer to the operating instructions for the system components.



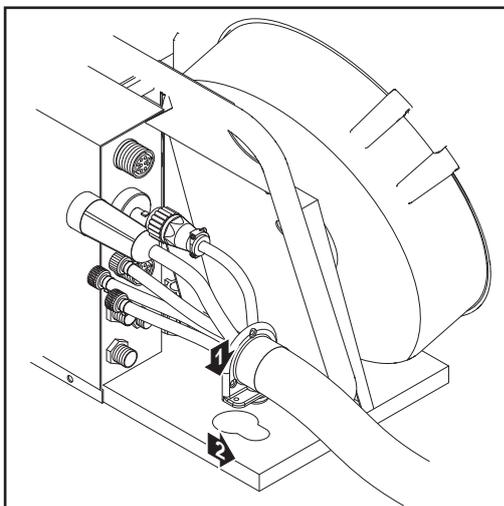
Fixing the strain-relief device in place



Fixing the strain-relief device to the trolley

- 1** Introduce the pin on the power source strain-relief device for the interconnecting-hosepack into the opening provided in the base of the trolley.
- 2** Use two screws supplied with the interconnecting hosepack to fasten the strain-relief device to the base of the trolley.

A strain-relief device is not provided in the case of 1.2 m (4 ft.) interconnecting hosepacks.



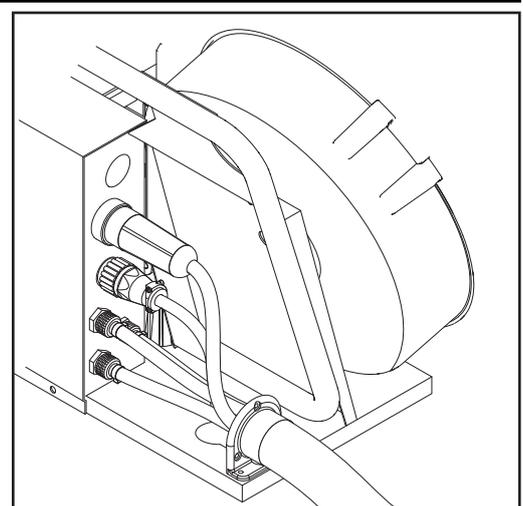
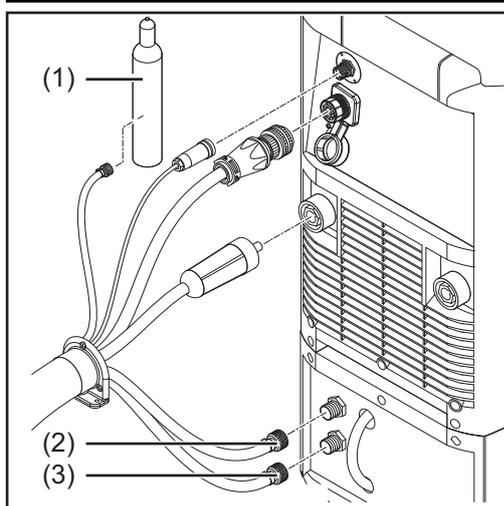
Fitting the strain-relief device to the wire-feed unit

- 3** Introduce the pin on the wire-feed unit strain-relief device for the interconnecting hosepack into the opening provided in the wire-feed unit.
- 4** Use two screws supplied with the interconnecting hosepack to fasten the strain-relief device to the wire-feed unit.

Connecting the interconnecting hosepack

NOTE!

There is no cooling unit present in the case of gas-cooled systems.
There is no need to attach the water connections in the case of gas-cooled systems.



- 1 Plug the welding potential bayonet plug on the interconnecting hosepack into the (+) socket and twist to fasten it
- 2 Plug the LocalNet plug on the interconnecting hosepack into the LocalNet connection and secure with a union nut
- 3 CMT power sources only:
Connect the LHSB plug to the LHSB connection
- 4 Connect the water feed hose (blue) (3) to the cooling unit
- 5 Connect the water return hose (red) (2) to the cooling unit
- 6 Connect the protective gas shield hose to the pressure regulator on the gas cylinder (1)
- 7 Connect the interconnecting hosepack to the wire-feed unit

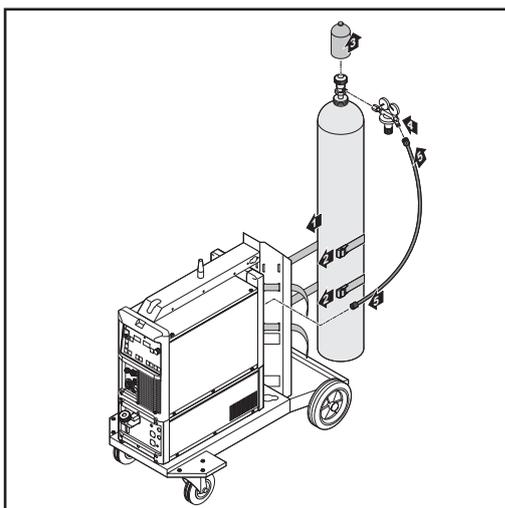
Connecting the gas cylinder

WARNING!

If gas cylinders topple over, there is a risk of very serious injury and damage.

Place gas cylinders on a solid, level surface so that they remain stable. Secure gas cylinders to prevent them from falling over.

Observe the safety rules of the gas cylinder manufacturer.



Fixing the gas cylinder on the trolley

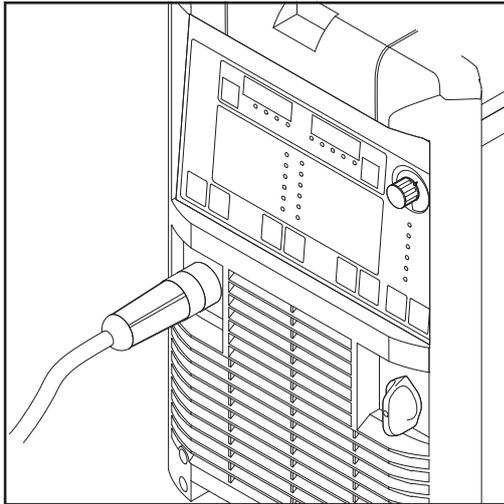
- 1 Place the gas cylinder on the base of the trolley
- 2 Secure the gas cylinder by fixing the cylinder strap around the upper part of the cylinder (but not around the neck) to prevent it from toppling over
- 3 Take the protective cap off the gas cylinder
- 4 Briefly open the gas cylinder valve to blow off any dust or dirt
- 5 Check the seal on the pressure regulator
- 6 Screw the pressure regulator onto the gas cylinder and tighten it
- 7 Connect the protective gas shield hose of the interconnecting hose pack to the pressure regulator using the gas hose

NOTE!

US devices are supplied with an adapter for the gas hose:

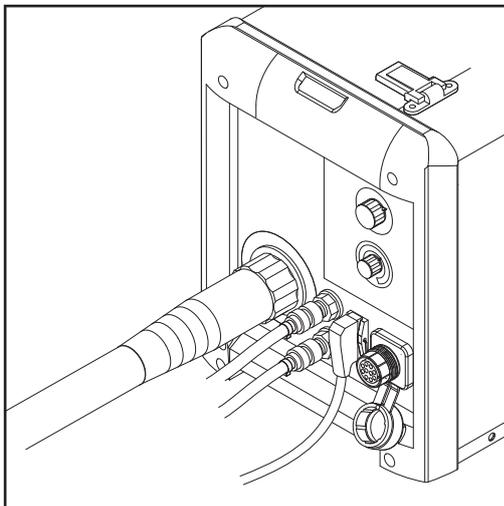
- ▶ Glue in or seal the adapter
- ▶ Test the adapter to ensure that it is gas tight.

Establishing a ground (earth) connection



- 1 Plug the grounding (earthing) cable into the (-) current socket and twist to fasten it
- 2 Use the other end of the grounding (earthing) cable to establish a connection to the workpiece

Connecting the welding torch



Welding torch and torch control connections on the VR 4000

- 1 Check that the torch is correctly and completely tooled up. Insert it - infeed tube first - into the torch connection on the wire-feed unit
- 2 Tighten the union nut by hand to fix the torch in place
- 3 Plug the control plug of the welding torch into the torch control connection and latch it in place

NOTE!

When altering the length and/or cross-section of the welding torch hosepack, measure the welding circuit resistance r and the welding circuit inductivity L (see "Further settings").

Other tasks

Carry out the following steps in accordance with the wire-feed unit operating instructions:

- 1 Insert the feed rollers in the wire-feed unit
- 2 Insert the wire spool or basket-type spool with adapter in the wire-feed unit
- 3 Feed in the wire electrode
- 4 Set the contact pressure
- 5 Adjust the brake

Commissioning the CMT4000 Advanced

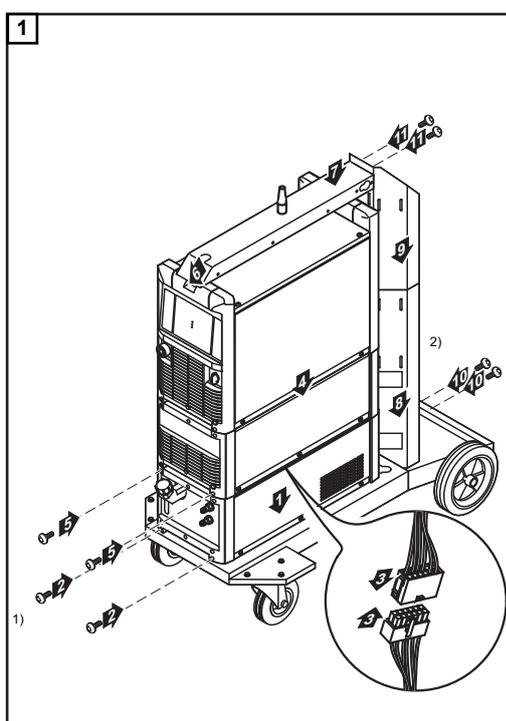
Fitting the system components (overview)

The diagram below is intended to show you how to fit the individual system components. For detailed information about the individual steps, please refer to the operating instructions for the system components.

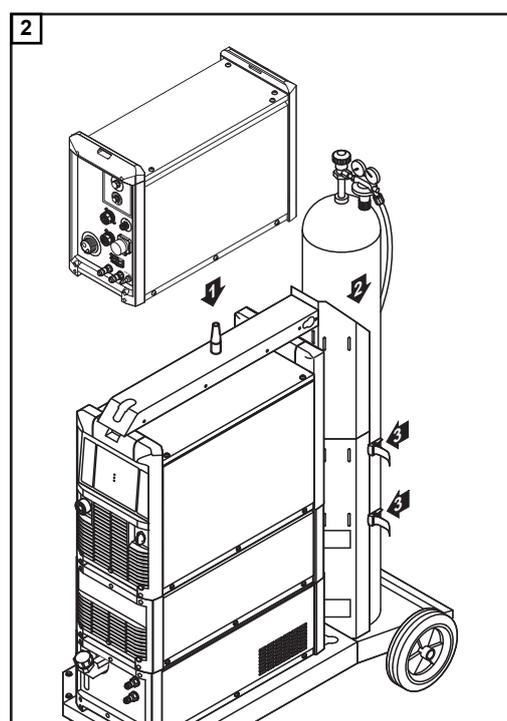
WARNING!

If gas cylinders topple over, there is a risk of very serious injury and damage. Place gas cylinders on a solid, level surface so that they remain stable. Secure gas cylinders to prevent them from falling over.

Observe the safety rules of the gas cylinder manufacturer.



Fitting the system components



Installing the wire-feed unit and setting up the gas cylinder

- 1) Fasten the cooling unit and power source to the back of the machine as well using 2 screws in each case
- 2) Cylinder holder extension

Connecting the interconnecting hosepack, CMT welding torch and wire buffer

For detailed information about the individual steps, please refer to the relevant operating instructions for the system components.

- 1) Fasten the strain-relief devices of the CMT interconnecting hosepack to the trolley and the wire-feed unit
- 2) Connect the CMT interconnecting hosepack to the power source and wire-feed unit
- 3) Connect the CMT hosepack to the CMT drive unit
- 4) Connect the wire buffer
- 5) Connect the CMT welding torch to the wire-feed unit

Other tasks

- 1 Connect the wirefeeding hose
- 2 Establish a ground (earth) connection between the workpiece and power source
- 3 Connect the gas cylinder
- 4 Connect the RCU 5000i remote control
- 5 Make the connection to the robot control

Preparing the wire-feed unit

Carry out the following steps in accordance with the wire-feed unit operating instructions:

- 1 Insert the feed rollers in the wire-feed unit
- 2 Insert the wirespool or basket-type spool with adapter in the wire-feed unit
- 3 Feed in the wire electrode
- 4 Set the contact pressure
- 5 Adjust the brake

Welding

MIG/MAG modes

General



WARNING!

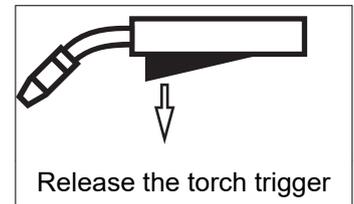
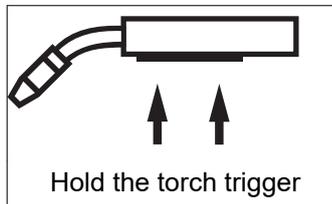
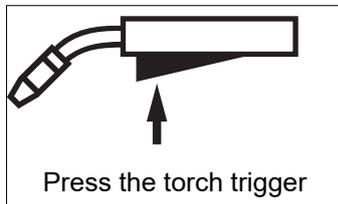
Danger from incorrect operation.

Possible serious injury and damage to property.

- ▶ Do not use the functions described here until you have read and completely understood these Operating Instructions.
- ▶ Do not use the functions described here until you have fully read and understood all of the Operating Instructions for the system components, in particular the safety rules!

See the Setup menu for information on settings, setting range and units of measurement for the available parameters.

Symbols and their explanations



GPr

Gas pre-flow time

I-S

Starting-current phase: the base material is heated up rapidly, despite the high thermal dissipation that occurs at the start of welding

SL

Slope: the starting current is continuously lowered as far as the welding current and the welding current as far as the final current

I

Welding-current phase: uniform thermal input into the base material, whose temperature is raised by the advancing heat

I-E

Crater-fill phase: to prevent any local overheating of the base material due to heat build-up towards the end of welding. This eliminates any risk of weld seam drop-through.

GPo

Gas post-flow time

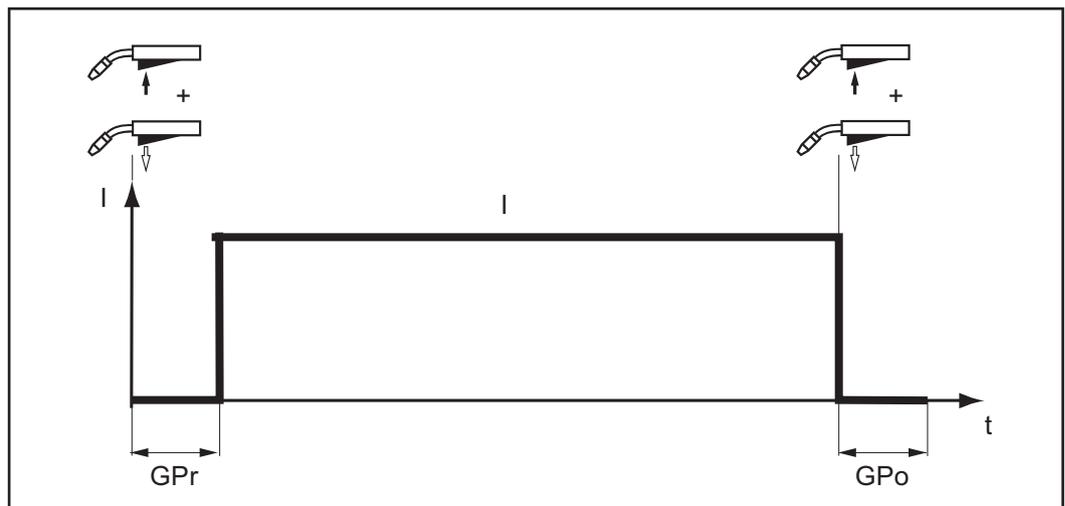
2-step mode



"2-step mode" is suitable for

- Tacking work
- Short weld seams
- Automated and robot welding

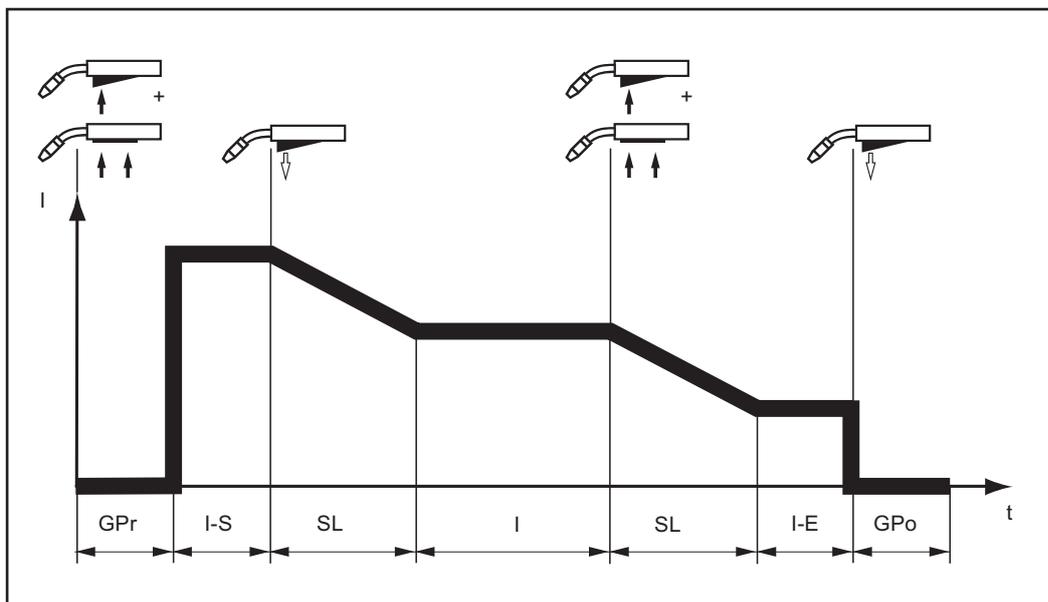
4-step mode



"4-step mode" is suitable for longer weld seams.

Special 4-step mode

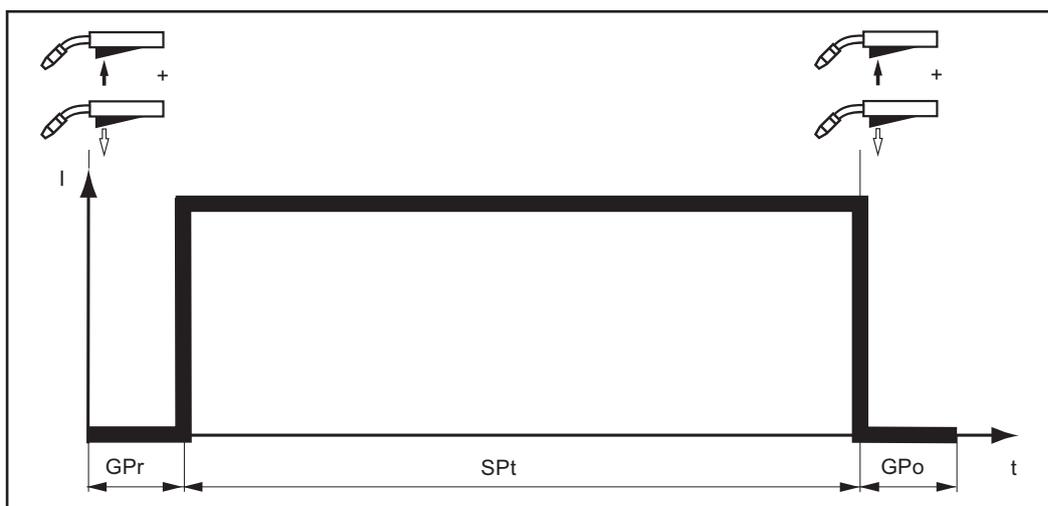
“Special 4-step mode ” is particularly suitable for welding aluminium materials. The special pattern of the welding current curve takes account of the high thermal conductivity of aluminium.



Spot welding

The “Spot welding” mode is suitable for welding joints on overlapped sheets. Procedure for spot welding:

- 1 Hold welding torch in the vertical
- 2 Press and release the torch trigger
- 3 Keep the torch in the same position
- 4 Wait until the end of the gas post-flow time
- 5 Lift the torch off the workpiece



The welding operation can be aborted by pressing the torch trigger a second time.

MIG/MAG welding

Safety



WARNING!

Danger from incorrect operation.

Possible serious injury and damage to property.

- ▶ Do not use the functions described here until you have read and completely understood these Operating Instructions.
 - ▶ Do not use the functions described here until you have fully read and understood all of the Operating Instructions for the system components, in particular the safety rules!
-



WARNING!

An electric shock can be fatal.

If the power source is connected to the mains electricity supply during installation, there is a high risk of very serious injury and damage.

- ▶ Before carrying out any work on the device make sure that the power source mains switch is in the "O" position
 - ▶ Before carrying out any work on the device make sure that the power source is unplugged from the mains
-

General tasks before MIG/MAG welding

- 1 Only where a cooling unit and water-cooled welding torch are used:
 - TPS 2700 with water cooling:
Plug the water hoses of the welding torch to the correct connection sockets on the cooling unit
 - TS 4000 / 5000, TPS 3200 / 4000 / 5000 with water cooling:
Connect the water hoses of the welding torch to the correct connection sockets on the wire-feed unit
- 2 Plug in the mains plug
- 3 Move the mains switch to the "I" position:
 - all the indicators on the control panel light up briefly
 - where applicable, the cooling unit starts to run

NOTE!

Follow the safety rules and note the operating conditions in the cooling unit operating instructions.

Overview

MIG/MAG welding is composed of the following sections:

- MIG/MAG synergic welding
- MIG/MAG standard manual welding
- CMT welding
- Special functions and options
- Robot welding

MIG/MAG synergic welding

General

The inputs required for MIG/MAG synergic welding (pulse/standard) are described by reference to the Comfort control panel.

MIG/MAG synergic welding

- 1 Press the Process button to select the desired welding process:



MIG/MAG pulse synergic welding



MIG/MAG standard synergic welding

- 2 Press the Material button to select the filler metal and shielding gas used

The assignment of SP1 and SP2 depends on the welding database used for the power source.

- 3 Press the Wire diameter button to select the diameter of the wire electrode

The assignment of SP depends on the welding database used for the power source.

- 4 Press the Mode button to select the desired MIG/MAG mode:



2-step mode



4-step mode



Special 4-step mode (aluminium welding start-up)



Spot welding

See the Setup menu for details of how to set the parameters for Special 4-step and Spot welding modes.

NOTE!

Parameters that have been set on a system component control panel (e.g. wire feed unit or remote control) might not be able to be changed on the power source control panel.

- 5 Press the Parameter selection button to select the welding parameters to be used to specify the welding power:



a-dimension



Sheet thickness



Welding current



Wire feed speed

NOTE!

Before selecting the a-dimension parameter, the welding speed parameter must be set (recommended welding speed for manual welding:- approx. 35 cm/min or 13.78 ipm).

- 6 Use the adjusting dial to set the selected parameter to the desired value. The parameter value is displayed in the digital display located above it.

The a-dimension, sheet thickness, welding current, wire feed speed and welding voltage parameters are directly interlinked. It is only necessary to alter one of the parameters, as the other parameters are immediately adjusted to match.

All welding parameter set values that have been set using the adjusting dial or buttons on the welding torch remain stored until the next time they are changed. This applies even if the power source is switched off and on again in the meantime.

- 7 Open the gas cylinder valve
8 Set the shielding gas flow rate:

 Press the Gas test button

- Turn the adjusting screw on the underside of the pressure regulator until the pressure gauge shows the required gas flow rate

 **CAUTION!**

Risk of injury and damage from electric shock and from the wire electrode emerging from the torch.

When pressing the torch trigger:

- ▶ keep the torch away from your face and body
- ▶ do not point the welding torch at people
- ▶ make sure that the wire electrode does not touch any electrically conducting or earthed (grounded) parts, such as the housing, etc.

- 9 Press the torch trigger and start welding

Corrections during welding

In order to obtain the best possible welding results, the following parameters can be corrected in certain circumstances:

 **Arc length correction**
for correcting the arc length

- shorter arc length
- 0 neutral arc length
- + longer arc length

 **Droplet detachment correction/arc force dynamic correction/arc force dynamic**

MIG/MAG pulse synergic welding:
for continuous correction of the droplet detachment energy

- lower droplet detachment force
- 0 neutral droplet detachment force
- + higher droplet detachment force

MIG/MAG standard synergic welding:
for influencing the short-circuiting dynamic at the instant of droplet transfer

- harder, more stable arc

- 0 neutral arc
- + soft, low-spatter arc

Gas pre-flow time

Gas post-flow time

Feeder creep speed

The settings for the background parameters gas pre-flow time, gas post-flow time and feeder creep speed are described in the Setup menu.

Adjusting parameters for correction

- 1 Press the Parameter selection button to select the parameter you wish to correct
- 2 Use the adjusting dial to set the selected parameter to the desired value. The parameter value is displayed in the digital display located above it.

Remarks on the Standard control panel

It is not possible to correct the arc length on the Standard control panel.

However, you can set the arc force correction as a background parameter in the Setup menu.

MIG/MAG standard manual welding

General

The MIG/MAG standard manual welding process is a MIG/MAG welding process with no Synergic function.

Changing one parameter does not result in any automatic adjustments to the other parameters. All of the variable parameters must therefore be adjusted individually, as dictated by the welding process in question.

The inputs required for MIG/MAG standard manual welding are described by reference to the "Comfort" control panel.

Available parameters

In MIG/MAG standard manual welding, the following parameters are available:



Wire feed speed

0.5 m/min (19.69 ipm) - maximum wire feed speed
e.g. 22.0 m/min (866.14 ipm)



Welding voltage

TPS 3200 / 4000 / 5000: 10.0 - 40.0 V
TPS 2700: 10.0 - 34.0 V



Dynamic correction

for influencing the short-circuiting dynamic at the instant of droplet transfer



Welding current

only the actual value is displayed

MIG/MAG standard manual welding

- 1 Press the Process button to select the MIG/MAG standard manual welding process



- 2 Press the Material button to select the filler metal and shielding gas used

The assignment of SP1 and SP2 depends on the welding database used for the power source.

- 3 Press the Wire diameter button to select the diameter of the wire electrode

The assignment of SP depends on the welding database used for the power source.

- 4 Press the Mode button to select the desired MIG/MAG mode:

-  2-step mode
-  4-step mode
-  Special 4-step mode (aluminium welding start-up)
-  Spot welding

In MIG/MAG standard manual welding, special 4-step mode corresponds to conventional 4-step mode.

The settings for the parameters for Spot welding mode are described in the Setup menu.

NOTE!

Parameters that have been set on a system component control panel (e.g. wire feed unit or remote control) might not be able to be changed on the power source control panel.

- 5 Press the Parameter selection button and select the wire feed speed parameter
- 6 Use the adjusting dial to set the desired value for the wire feed speed
- 7 Press the Parameter selection button and select the welding voltage parameter
- 8 Use the adjusting dial to set the desired value for the welding voltage

The parameter value is displayed in the digital display located above it.

All welding parameter set values that have been set using the adjusting dial or buttons on the welding torch remain stored until the next time they are changed. This is true even if the power source is switched off and on again in the meantime

To display the actual welding current during welding:

- press the Parameter selection button and select the welding current parameter
- the actual welding current is displayed on the digital display during welding

- 9 Open the gas cylinder valve
- 10 Set the shielding gas flow rate:

-  Press the Gas test button
- Turn the adjusting screw on the underside of the pressure regulator until the pressure gauge shows the required gas flow rate

CAUTION!

Risk of injury and damage from electric shock and from the wire electrode emerging from the torch.

When pressing the torch trigger:

- ▶ keep the torch away from your face and body
- ▶ do not point the welding torch at people
- ▶ make sure that the wire electrode does not touch any electrically conducting or earthed (grounded) parts, such as the housing, etc.

- 11 Press the torch trigger and start welding

Corrections during welding

In order to obtain the best possible welding results, the following parameters can be corrected in certain circumstances:

**Dynamic correction**

for influencing the short-circuiting dynamic at the instant of droplet transfer

0 harder, more stable arc

10 soft, low-spatter arc

Gas pre-flow time**Gas post-flow time****Feeder creep speed**

The settings for the background parameters gas pre-flow time, gas post-flow time and feeder creep speed are described in the Setup menu.

Adjusting parameters for correction

- 1** Press the Parameter selection button to select the parameter you wish to correct
- 2** Use the adjusting dial to set the selected parameter to the desired value. The parameter value is displayed in the digital display located above it.

CMT welding

General

The inputs required for CMT welding are described by reference to the CMT control panel.
Settings for CMT applications with the CMT remote power source and the RCU 5000i remote control can be found in the operating instructions for the RCU 5000i remote control.

CMT welding

- 1 Press the Process button to select the CMT/CMT pulse process:



- 2 Press the Material button to select the filler metal and shielding gas used

Filler metals for CMT welding:

1	ER 70 S-3/6	Steel
3	ER 308	CrNi 19 9
5	ER 4043	AlSi 5
6	ER CuSi-A	CuSi 3
8	SP 1	1)
10	Steel	ER 70 S-3/6
12	CrNi 19 9	ER 308
14	AlSi 5	ER 4043
15	CuSi 3	ER CuSi-A
16	SP 2	1)

To weld the other filler metals, select one of the following processes:



MIG/MAG pulse synergic welding



MIG/MAG standard synergic welding

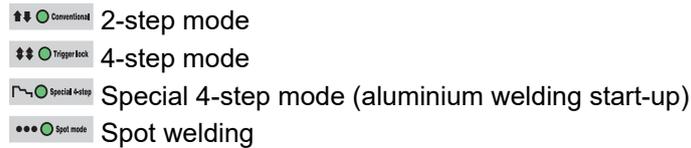


MIG/MAG standard manual welding

- 1) The assignment of SP1 and SP2 depends on the welding database used for the power source.
- 3 Press the Wire diameter button to select the diameter of the wire electrode

The assignment of SP depends on the welding database used for the power source.

- 4 Press the Mode button to select the desired MIG/MAG mode:



See the Setup menu for details of how to set the parameters for Special 4-step and Spot welding modes.

NOTE!

Parameters that have been set on a system component control panel (e.g. wire feed unit or remote control) might not be able to be changed on the power source control panel.

- 5 Press the Parameter selection button to select the welding parameters to be used to specify the welding power:

Sheet thickness

Welding current

Wire feed speed

- 6 Use the adjusting dial to set the selected parameter to the desired value. The parameter value is displayed in the digital display located above it.

The sheet thickness, welding current, wire feed speed and welding voltage parameters are directly interlinked. It is only necessary to alter one of the parameters, as the other parameters are immediately adjusted to match.

All welding parameter set values that have been set using the adjusting dial or buttons on the welding torch remain stored until the next time they are changed. This applies even if the power source is switched off and on again in the meantime.

- 7 Open the gas cylinder valve

- 8 Set the shielding gas flow rate:

Press the Purge (Gas test) button

- Turn the adjusting screw on the underside of the pressure regulator until the pressure gauge shows the required gas flow rate

CAUTION!

Risk of injury and damage from electric shock and from the wire electrode emerging from the torch.

When pressing the torch trigger:

- ▶ keep the torch away from your face and body
- ▶ do not point the welding torch at people
- ▶ make sure that the wire electrode does not touch any electrically conducting or earthed (grounded) parts, such as the housing, etc.

- 9 Press the torch trigger and start welding

Corrections during welding

In order to obtain the best possible welding results, the following parameters can be corrected in certain circumstances:

 **Arc length correction**
for correcting the arc length

- shorter arc length
- 0 neutral arc length
- + longer arc length

 **Droplet detachment correction/arc force dynamic correction/arc force dynamic**

depending on the selected filler metal and wire electrode diameter, different settings are corrected with this parameter:

Boost correction

sets the boost current for controlling the heat input to the base material

- 5 maximum boost current
- 0 neutral boost current
- +5 maximum boost current

The boost current can be corrected for the following filler metals:

- CrNi 19 9 / Ar + 2.5 % CO₂ / 1.2 mm
- CuSi 3 / 100 % Ar / 0.8 mm
- CuSi 3 / 100 % Ar / 1.0 mm
- CuSi 3 / 100 % Ar / 1.2 mm

Dynamic correction

for influencing the short-circuiting dynamic at the instant of droplet transfer

- 5 harder, more stable arc
- 0 neutral arc
- +5 soft, low-spatter arc

The arc force dynamic can be corrected with the following filler metals:

- G3Si 1 / Ar + 18 % CO₂ / 1.0 mm
- G3Si 1 / Ar + 18 % CO₂ / 1.2 mm

HotStart pulse cycles

for setting the HotStart pulse cycles

- 5 0 pulses
- +5 100 pulses

The HotStart pulse cycles can be corrected with the following filler metals:

- AlMg 4.5 Mn / 100 % Ar / 1.2 mm (CMT 0875)

HotStart time

for setting the HotStart time

- 5 HotStart time = 0
 - +5 HotStart time = 200 ms
-

The HotStart pulse cycles can be corrected with the following filler metals:

- AlMg 4.5 Mn / 100 % Ar / 1.2 mm (CMT 0874)¹⁾
- AlSi 5 / 100% Ar / 1.2 mm
- CrNi 19 9 / Ar + 2.5 % CO₂ / 0.8 mm
- CrNi 19 9 / Ar + 2.5 % CO₂ / 1.0 mm
- CuAl 5 Ni 2 / 100 % Ar / 1.0 mm

Pulse correction

for continuous correction of the droplet detachment energy

- 5 lower droplet detachment force
- 0 neutral droplet detachment force
- +5 higher droplet detachment force

The pulse can be corrected with the following filler metals:

- AlMg 4.5 Mn / 100% Ar / 1.2 mm ²⁾
- AlSi 5 / 100 % Ar / 1.2 mm (CMT 0880) ^{2) 3)}
- AlSi 5 / 100 % Ar / 1.2 mm (CMT 0881) ^{2) 4)}
- CrNi 19 9 / Ar + 2.5 % CO₂ / 0.8 mm ²⁾
- CrNi 19 9 / Ar + 2.5 % CO₂ / 1.0 mm ²⁾
- CrNi 19 9 / Ar + 2.5 % CO₂ / 1.2 mm ²⁾
- CuAl 8 / 100 % Ar / 1.0 mm ²⁾
- CuSi 3 / 100 % Ar / 1.0 mm ²⁾

Notes

- 1) Different ignition process from the CMT 0875 characteristic
- 2) Combination of CMT characteristic and pulse characteristic
- 3) CMT/pulse characteristic with more pulse cycles than CMT cycles
- 4) CMT/pulse characteristic with fewer pulse cycles than CMT cycles

Gas pre-flow time

Gas post-flow time

Feeder creep speed

The settings for the background parameters gas pre-flow time, gas post-flow time and feeder creep speed are described in the Setup menu.

Adjusting parameters for correction

- 1 Press the Parameter selection button to select the parameter you wish to correct
- 2 Use the adjusting dial to set the selected parameter to the desired value. The parameter value is displayed in the digital display located above it.

Special functions and options

Arc break watchdog function

If the arc breaks and no current starts to flow again within a time defined in the Setup menu, the system cuts out automatically. The service code "no | Arc" appears on the control panel.

NOTE!

At maximum welding current and very low arc length it is possible that the arc will break without the service code "no | Arc" appearing.

If the arc is reduced significantly, the welding current would have to be increased to more than the maximum current in order to be able to maintain the requested welding power. As this is not acceptable, the power source switches off for safety reasons.

To start welding again, press the torch trigger again.

In the factory settings, the arc break watchdog function (Arc) is set to OFF.

The settings for the arc break watchdog parameter (Arc) are described in "Setup menu - level 2".

Ignition time-out function

The power source has the Ignition time-out function. This function is not factory-activated as standard.

Once the torch trigger is pressed, gas pre-flow begins immediately. Wire feeding then begins, followed by ignition. If no current starts flowing before the length of wire specified in the Setup menu has been fed, the power source cuts out automatically. The service code "no | IGn" appears on the control panel.

"E55" is displayed on the JobMaster torch and on the field bus module.

To make another attempt to achieve ignition, press the torch trigger again.

The settings for the Ignition time-out parameter (ito) are described in the "Setup-menu-level 2" section.

Spatter-free ignition option

The spatter free ignition option (SFi) makes it possible to ignite the arc with practically no spatter. At the beginning of welding, the wire is slowly fed as far as the surface of the workpiece and then stopped as soon as it touches it. Next, the welding current is activated and the wire is pulled back. Once the correct arc length has been reached, the wire starts being fed at the speed specified for this welding process.

NOTE!

The optimum function of the spatter-free ignition option can only be guaranteed in aluminium applications in conjunction with Fronius push-pull wire-feed unit systems.

System requirements:

- Firmware version on the power source: OFFICIAL UST V2.60.1
- Firmware version on the wire-feed unit: OFFICIAL SR41 V1.40.15

NOTE!

External enabling of the spatter-free ignition option is possible from firmware version OFFICIAL UST V2.70.1 (power source) upwards. At present, this option only supports aluminium wires of diameters:

- ▶ 0.8 mm / 1.0 mm / 1.2 mm / 1.6 mm
 - ▶ USA: 0.9 mm (0.035 in.) / 1.2 mm (0.045 in.) / 1.6 mm (1/16 in.)
-

NOTE!

Not all of the stored welding programs support the SFI function.

SFI is automatically deactivated on changing to a welding program that does not support the SFI function.

SFI must be re-activated on changing back to a program that supports the SFI function.

More information about whether a welding program supports SFI can be found on the sticker with the program chart on the power source.

The SFI function is set in the Process setup menu (Fdc parameter).

SynchroPulse option

The SynchroPulse option is recommended for welding aluminium alloys where you want to give the weld seams a rippled appearance. This effect is achieved by having the welding power alternate between two operating points.

The two operating points result from the welding output being changed - positively and negatively - by an adjustable dFd value that can be set in the Setup menu (welding power offset: 0.0 - 2.0 m/min or 0.0 - 78.74 ipm).

Additional parameters for SynchroPulse:

- Frequency F for alternating between operating points (set in the Setup menu)
- Arc length correction for the lower operating point (set using the arc length correction parameter on the control panel)
- Arc length correction for the higher operating point (set in the Setup menu, parameter Al.2)

In order to activate SynchroPulse, you must (as a minimum) change the value of the parameter F (frequency) in the Process setup menu from OFF to between 0.5 and 5 Hz.

System requirements:

- Firmware version on the power source: OFFICIAL UST V2.60.4
- Firmware version on the wire-feed unit: OFFICIAL SR 1 V1.40.15

NOTE!

External enabling of the SynchroPulse option is possible from firmware version OFFICIAL UST V2.70.1 (power source) upwards. Only Fronius push-pull wire-feed unit systems are supported.

NOTE!

As long as the Standard manual welding process is selected, the SynchroPulse option is not supported.

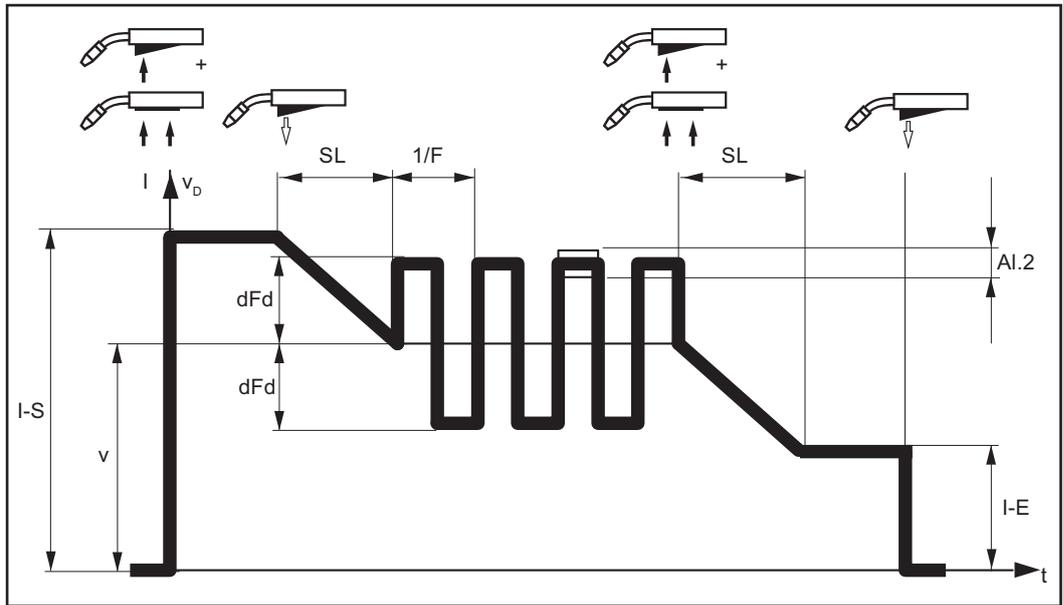
Function of SynchroPulse in "Special 4-step" mode

I-S = Starting current phase

SL = Slope

I-E = End-crater phase

v = Wire feed speed



SynchroPulse function

Robot welding

Prerequisite

A robot interface or field bus system is needed in order to be able to control the power source from a robot control unit.

General

2-step mode is selected automatically if a ROB 4000 / 5000 robot interface or field bus system is connected. The mode can only be changed using the Mode button when the robot interface or field bus has been disconnected from the LocalNet.

If a ROB 3000 robot interface is connected, any mode (2-step mode, 4-step mode, special 4-step mode, etc.) can be selected.

More information about robot welding can be found in the operating instructions for the robot interface or field bus systems and in the "Robot-interface" leaflet (42,0410,0616).

Special 2-step mode for robot interface

The special 2-step mode function is available if a robot interface or field bus system is connected to the LocalNet.

Function of special 2-step mode for robot interface

I-S = Starting current phase

SL = Slope

I-E = End-crater phase

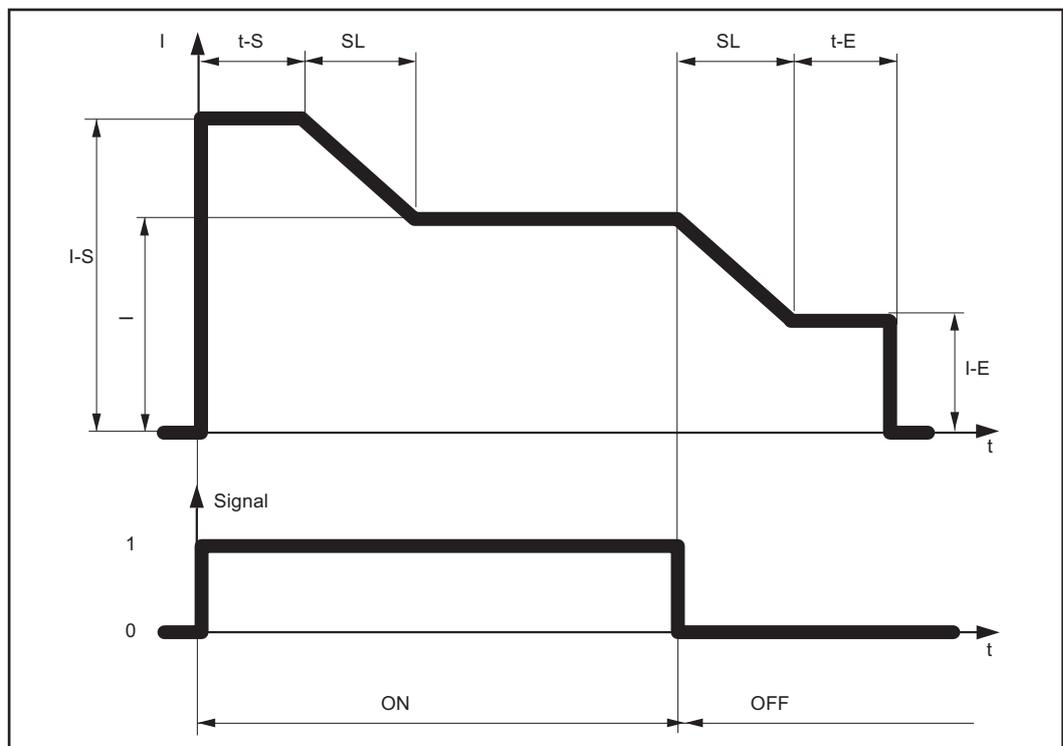
t-S = Starting current duration

t-E = Final current duration

Signal = Robot signal

ON = Welding start

OFF = Welding stop



Function of special 2-step mode

Wire-stick control function

The wire-stick control function is available if a robot interface or field bus system is connected to the LocalNet.

After the end of welding, the wire-stick control function detects any "sticking" of the wire electrode in the solidifying weld pool. If a sticking wire electrode is detected within 750 ms after the end of welding, the error message "Err | 054" will be output.

Procedure in the event of a sticking wire electrode:

WARNING!

A welding process that starts automatically can pose a risk to life.

The "Arc on" signal must not be set while the error is being rectified, otherwise welding will start as soon as the error is rectified.

- 1 Cut off the end of the wire electrode that is sticking

NOTE!

The error message "Err | 054" does not need to be acknowledged.

The power source is now ready for operation.

NOTE!

The standard factory setting is that the wire-stick control function is not activated.

If required, activate the wire-stick control function in the "Setup menu - level 2" ("Stc | ON").

Changing the welding process during CMT Advanced welding

NOTE!

Neither the welding process nor the currently selected characteristic can be changed during CMT Advanced welding.

To change the welding process or characteristic:

- 1 first, end the CMT Advanced process
- 2 wait 300 - 600 ms
Another welding process or characteristic can be selected during this time.
- 3 Resume the welding process with another welding process or characteristic

TIG welding

Safety



WARNING!

Danger from incorrect operation.

Possible serious injury and damage to property.

- ▶ Do not use the functions described here until you have read and completely understood these Operating Instructions.
 - ▶ Do not use the functions described here until you have fully read and understood all of the Operating Instructions for the system components, in particular the safety rules!
-



WARNING!

An electric shock can be fatal.

If the power source is connected to the mains electricity supply during installation, there is a high risk of very serious injury and damage.

- ▶ Before carrying out any work on the device make sure that the power source mains switch is in the "O" position
 - ▶ Before carrying out any work on the device make sure that the power source is unplugged from the mains
-

Prerequisite

The TIG welding process is only possible

- with the Comfort, US and TIME 5000 Digital control panels
- with a TIG gas valve torch

The inputs required for TIG welding are described by reference to the Comfort control panel.

Preparation

- 1 Move the mains switch to the "O" position
- 2 Disconnect the mains plug
- 3 Remove the MIG/MAG welding torch
- 4 Disconnect the grounding (earthing) cable from the (-) current socket
- 5 Plug the grounding (earthing) cable into the (+) current socket and latch it in place
- 6 Use the other end of the grounding (earthing) cable to establish a connection to the workpiece
- 7 Plug the bayonet current plug on the TIG gas valve torch into the (-) current socket and twist it clockwise to fasten it
- 8 Screw the pressure regulator onto the (argon) gas cylinder and tighten it
- 9 Connect the gas hose of the TIG gas valve torch to the pressure regulator
- 10 Plug in the mains plug

TIG welding

⚠ CAUTION!**Risk of injury and damage from electric shock.**

As soon as the mains switch is in the "I" position, the tungsten electrode of the welding torch is LIVE. Make sure that the tungsten electrode does not touch any persons or electrically conducting or earthed parts (e.g. housing, etc.)

- 1 Move the mains switch to the "I" position: all the indicators on the control panel light up briefly
- 2 Press the Process button to select the TIG welding process:



The welding voltage is connected to the welding socket with a 3-second time lag.

NOTE!

Parameters that have been set on a system component control panel (e.g. wire feed unit or remote control) might not be able to be changed on the power source control panel.

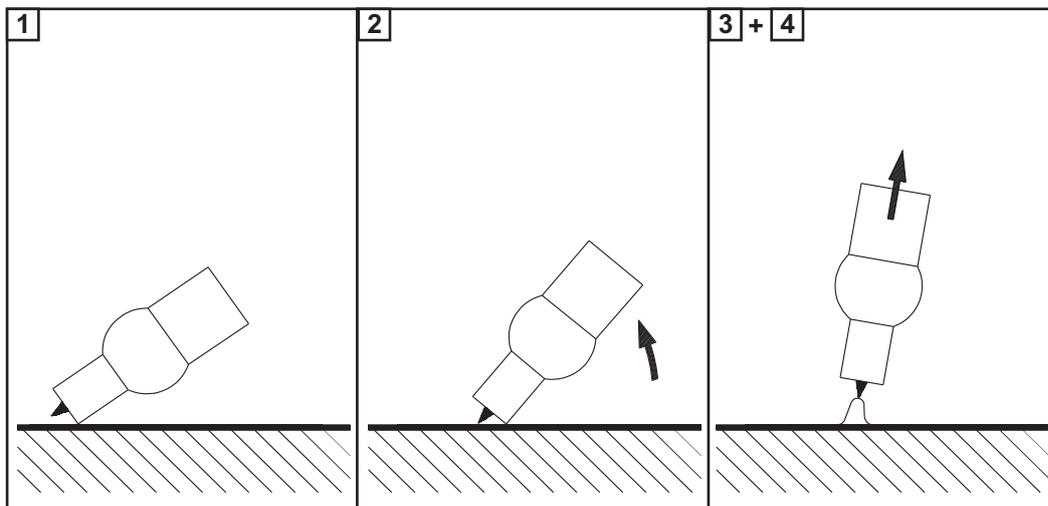
- 3 Press the Parameter selection button. The LED indicator on the button must light up.
- 4 Use the adjusting dial to set the desired amperage.
The amperage value is shown in the left-hand digital display.

All welding parameter set values that have been set using the adjusting dial remain stored until the next time they are changed. This applies even if the power source is switched off and on again in the meantime.

- 5 Open the gas stop valve on the TIG gas valve torch
- 6 Set the desired shielding gas flow rate on the pressure regulator
- 7 Start welding (ignite the arc)

Igniting the arc

The welding arc is ignited by touching the workpiece with the tungsten electrode.



- 1 Place the gas nozzle on the ignition location so that there is a gap of 2-3 mm (0.08 - 0.12 in.) between the tip of the tungsten electrode and the workpiece
- 2 Gradually tilt the welding torch up until the tungsten electrode touches the workpiece

- 3 Raise the torch and tilt it into the normal position - the arc now ignites
- 4 Carry out welding

Finishing welding

- 1 Lift the TIG gas-valve torch away from the workpiece until the arc goes out.

IMPORTANT! To protect the tungsten electrode, ensure that the shielding gas at the end of welding flows for long enough to allow the tungsten electrode to cool sufficiently.

- 2 Close the gas stop valve on the TIG gas-valve torch
-

TIG Comfort Stop option

If desired, the power source can also be fitted with the optional "TIG Comfort Stop".

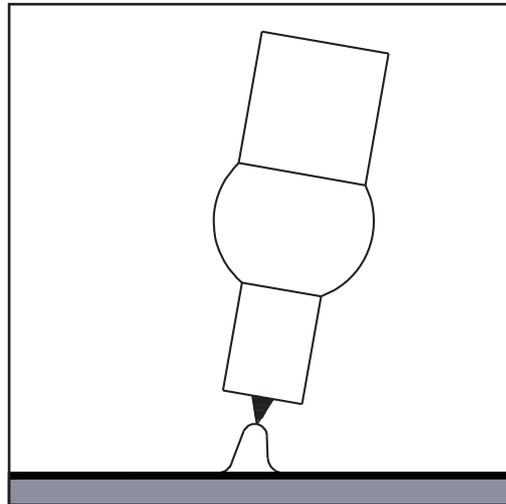
At the end of the welding operation, the welding current is switched off automatically if the length of the arc increases by more than a defined amount. This prevents the arc being unnecessarily elongated when the TIG gas-valve torch is lifted off the workpiece.

System requirement:

Firmware version OFFICIAL UST V3.00.2 on the power source

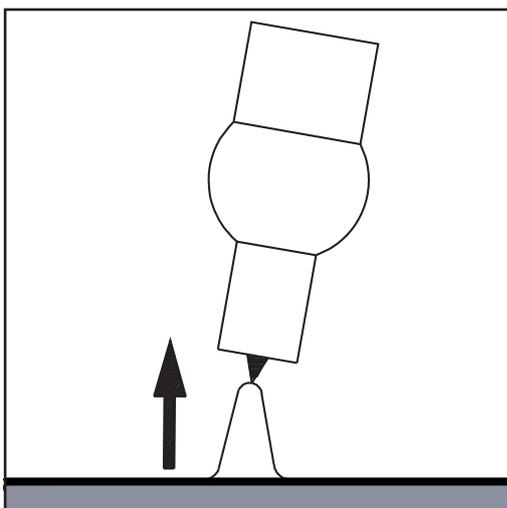
The standard factory setting is that the optional "TIG Comfort Stop" function of the power source is deactivated.

The "TIG Comfort Stop" function is activated and set by means of the CSS parameter. The CSS parameter is described in the "Setup menu - level 2", "TIG welding".



- 1 Welding

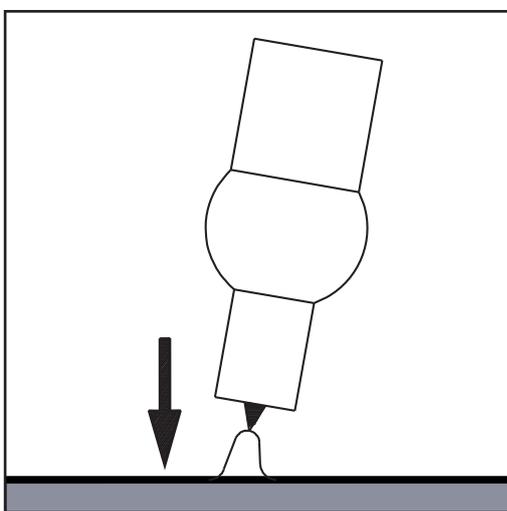
Welding



Raising the torch

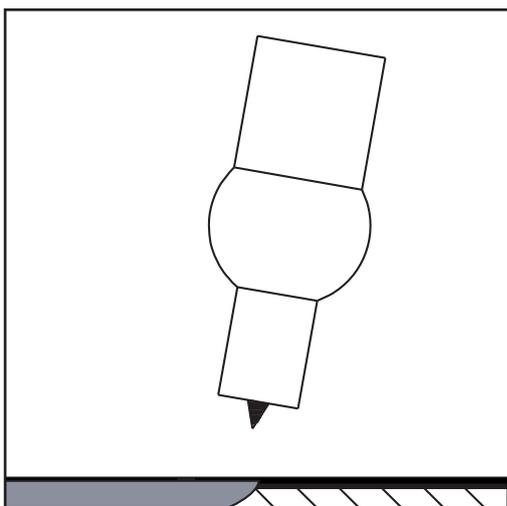
- 2 At the end of the welding action, briefly raise the torch

The arc length is increased significantly.



Lowering the torch

- 3 Lower the welding torch
- The arc length is reduced significantly
 - The optional TIG Comfort Stop function is triggered



Keeping the torch at the same height and then removing it

- 4 Keep the torch in the same position
- The welding current is continuously decreased (downslope)
 - The arc goes out

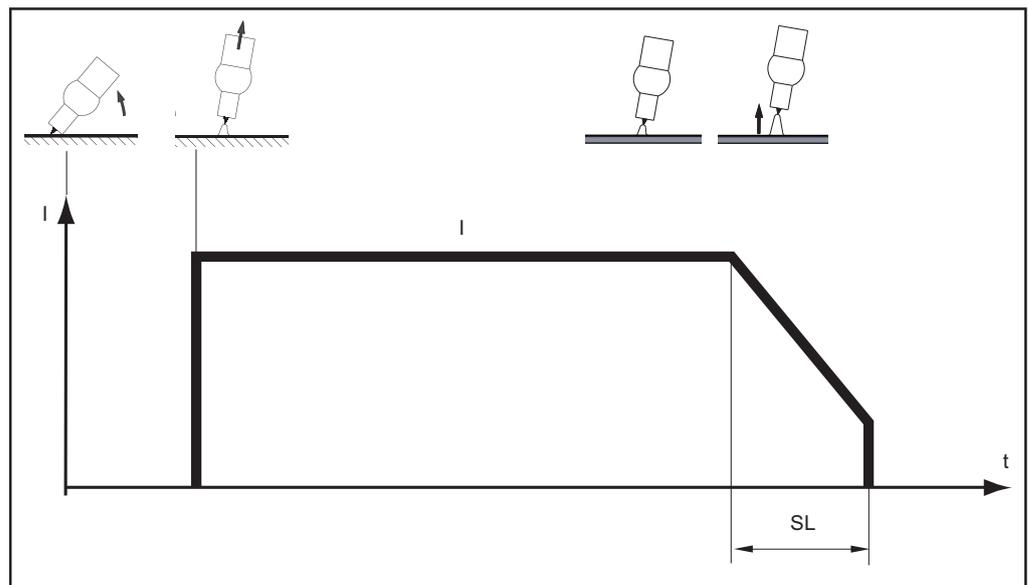
NOTE!

The downslope is preset and cannot be adjusted.

- 5 Raise the torch from the workpiece.

I Preset welding current

SL Downslope



TIG welding process with the optional TIG Comfort Stop function activated

MMA welding

Safety

WARNING!

Danger from incorrect operation.

Possible serious injury and damage to property.

- ▶ Do not use the functions described here until you have read and completely understood these Operating Instructions.
- ▶ Do not use the functions described here until you have fully read and understood all of the Operating Instructions for the system components, in particular the safety rules!

WARNING!

An electric shock can be fatal.

If the power source is connected to the mains electricity supply during installation, there is a high risk of very serious injury and damage.

- ▶ Before carrying out any work on the device make sure that the power source mains switch is in the "O" position
- ▶ Before carrying out any work on the device make sure that the power source is unplugged from the mains

Prerequisite

Manual metal arc (MMA) welding is only possible in conjunction with the Comfort, US, TIME 5000 Digital and CMT control panels.

The inputs required for MMA welding are described by reference to the Comfort control panel.

Preparation

- 1 Move the mains switch to the "O" position
- 2 Disconnect the mains plug
- 3 Remove the MIG/MAG welding torch

NOTE!

Check the rod electrode packaging to determine whether the rod electrodes are for (+) or (-) welding.

- 4 Plug the grounding (earthing) cable into either the (-) or the (+) current socket, depending on the type of electrode, and latch it in firmly
- 5 Use the other end of the grounding (earthing) cable to establish a connection to the workpiece
- 6 Plug the bayonet current plug of the electrode holder cable into the free current socket with the opposite polarity, according to the type of electrode, and twist it clockwise to latch it in place
- 7 Plug in the mains plug

Manual metal arc welding

CAUTION!

Risk of injury and damage from electric shock.

As soon as the mains switch is in the "I" position, the rod electrode in the electrode holder is LIVE. Make sure that the rod electrode does not touch any persons or electrically conducting or earthed parts (e.g. the housing etc.).

- 1 Move the mains switch to the "I" position: all the indicators on the control panel light up briefly
- 2 Press the Process button to select the MMA welding process:



The welding voltage is connected to the welding socket with a 3-second time lag.

If the MMA welding process is selected, any cooling unit present is automatically deactivated. It is not possible to switch it on.

NOTE!

Parameters that have been set on a system component control panel (e.g. wire feed unit or remote control) might not be able to be changed on the power source control panel.

- 3 Press the Parameter selection button. The LED indicator on the button must light up.
- 4 Use the adjusting dial to set the desired amperage.
The amperage value is shown in the left-hand digital display.

All welding parameter set values that have been set using the adjusting dial remain stored until the next time they are changed. This applies even if the power source is switched off and on again in the meantime.

- 5 Start welding

NOTE!

The power source has a pulsating open circuit voltage.

When the MMA welding process is selected, the right hand digital display shows an average welding voltage value of 40 V before welding begins (open circuit). The following maximum welding voltages are available for the welding start and the welding process to ensure optimum ignition properties:

- ▶ TPS 2700 ... 50 V
- ▶ TS 4000 / 5000, TPS 3200 / 4000 / 5000 ... 70 V

Corrections during welding

In order to obtain the best possible welding results, the following parameter can be corrected in certain circumstances:



Arc-force dynamic

to influence the short-circuiting dynamic at the instant of droplet transfer

- | | |
|-----|-------------------------|
| 0 | soft, low-spatter arc |
| 100 | harder, more stable arc |

Adjusting parameters for correction

- 1 Press the Parameter selection button to select the parameter you wish to correct
- 2 Use the adjusting dial to set the selected parameter to the desired value. The parameter value is displayed in the digital display located above it.

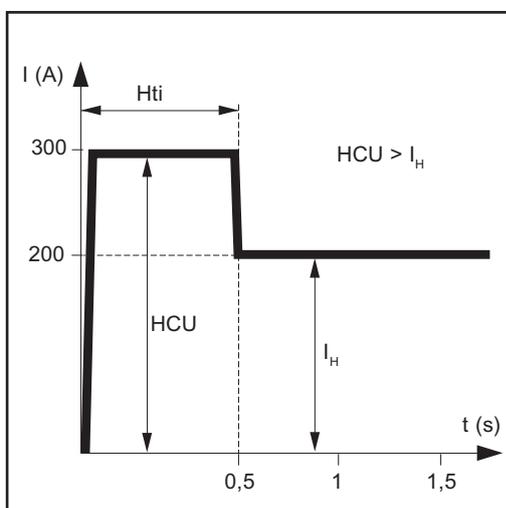
HotStart function

To obtain optimum welding results, it will sometimes be necessary to adjust the HotStart function.

Benefits

- Improved ignition, even when using electrodes with poor ignition properties
- Better fusion of the base material during start-up phase, meaning fewer cold-shut defects
- Largely prevents slag inclusions

See the "Setup menu: level 2" section for details on setting the available welding parameters.



Example of "Hotstart" function

Legend

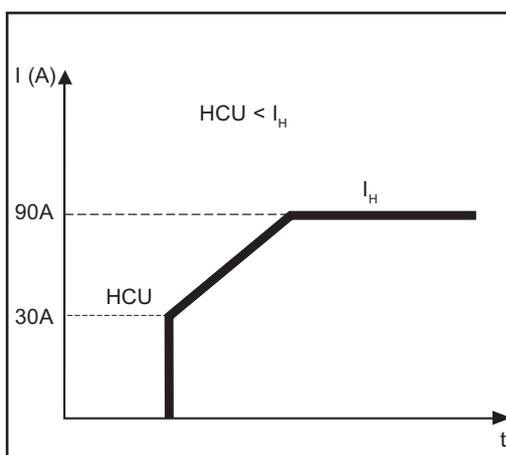
- Hti Hot-current time, 0 - 2 s, factory setting: 0.5 s
 HCU ... Hot-start current, 0 - 200%, factory setting 150 %
 I_H Main current = set welding current

Function:

during the specified hot-current time (Hti), the welding current is increased to a certain value. This value (HCU) is higher than the selected welding current (I_H).

SoftStart function

The SoftStart function is intended for basic electrodes. Ignition takes place at a low welding current. Once the arc is stable, the welding current continues to rise until it reaches the welding current command value.



Example of "SoftStart" function

Benefits

- Improved ignition properties for electrodes that ignite at low welding currents
- Largely prevents slag inclusions
- Reduces welding spatter

Legend

- HCU ... Hot-start current, 0 - 200%, factory setting 150 %
 I_H Main current = set welding current

Anti-stick function

As the arc becomes shorter, the welding voltage may drop so far that the rod electrode will tend to stick. This may also cause the rod electrode to burn out.

Electrode burn-out is prevented by activating the anti-stick function. If the rod electrode begins to stick, the power source immediately switches the welding current off. After the rod electrode has been detached from the workpiece, the welding process can be continued without any problems.

The anti-stick function can be activated and deactivated in the "Setup menu: level 2" section.

Job mode

General Job mode enhances the quality of welding engineering fabrication, both in manual and automated welding.

Up to 100 common jobs (operating points) can be reproduced in job mode, avoiding the need to document parameters by hand.

Prerequisites Job mode is only available on power sources with the following control panels:

- Comfort control panel
- US control panel
- TIME 5000 Digital control panel
- CMT control panel

Restrictions Job mode is not available with the TR 2100 TIME remote control and the VR 4000-30 TIME wire-feed unit. Once the remote control or wire-feed unit is connected, the MIG/MAG pulse synergic welding process is automatically selected. No other process can be selected on the power source.

Job mode displays on the left-hand digital display The following job mode displays are used on the left-hand digital display:

- - - No job in this program location (only when you try to retrieve a job from this location, otherwise nPG)
- nPG ... No job in this program location
- PrG ... There is a job in this program location
- Pro Job is being created / copied in this program location
- dEL ... Job is being deleted from this program location

Selecting job mode as the process

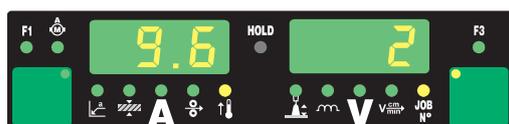
1 Press the Process button to select Job mode as the process:



The following activities have to be carried out in Job mode:

- Retrieve a job
- Copy/overwrite a job

The display shows the last job to be used.



Creating a job

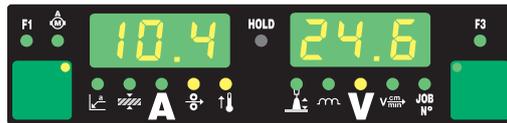
NOTE!

Jobs are not created in the Job mode process.

Jobs can be created in the MIG/MAG pulse synergic welding, MIG/MAG standard synergic welding, MIG/MAG standard manual welding, TIG welding and MMA welding processes.

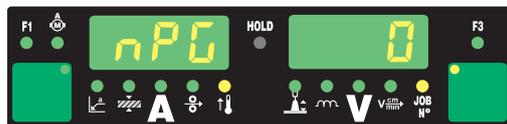
The device comes with no jobs pre-programmed. To create a job, proceed as follows:

- 1 Set the desired welding parameters that you want to store as a "Job".

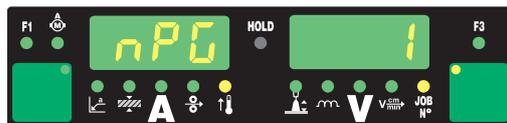


- 2 Briefly press the Store button to change to the job menu

The first vacant program location for the job is indicated.



- 3 Select the desired program location with the adjusting dial, or else leave the suggested program location unchanged



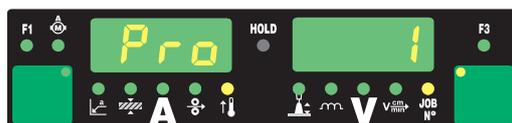
- 4 Press and hold the Store button

NOTE!

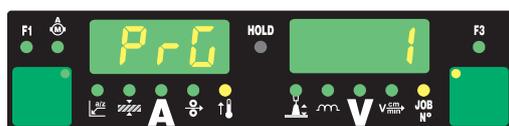
If the selected program location already has a job stored in it, then this existing job will be overwritten with the new job.

This action cannot be undone.

The left-hand digital display reads "Pro" - the job is stored in the program location you have just selected.



"PrG" appears on the left-hand digital display to indicate that the job is now stored.



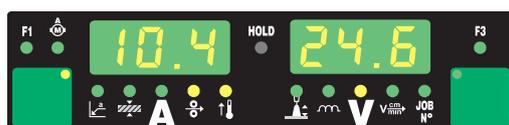
NOTE!

The parameters from the Setup menu are also stored for each job with the exception of the following functions:

- ▶ Push-pull unit
- ▶ Cooling unit switch-off
- ▶ Measuring the welding circuit resistance
- ▶ Measuring the welding circuit inductivity

- 5 Release the Store button
- 6 Briefly press the Store button to exit from the Job menu

The power source switches to the setting selected before the job was stored.



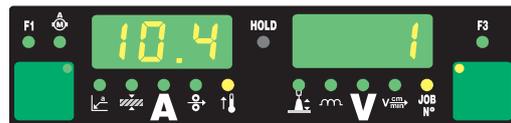
Retrieving a job

NOTE!

Before retrieving a job, make sure that the welding system has been installed and set up for the job.

Jobs are retrieved in the job mode process.

- 1 Use the adjusting dial to select the desired job



MIG/MAG jobs can also be selected via the JobMaster or Up/Down welding torches.

When you retrieve a job directly from the power source, you can also select vacant program locations (symbolised by "- - -"). Only pre-programmed program locations can be selected via the JobMaster or Up/Down torches, however.

To view the settings for the selected job, use the "Parameter selection" buttons. The settings cannot be modified. The process and operating mode of the stored job are also displayed.

- 2 Start welding
Welding takes place with the welding parameters stored in the job.

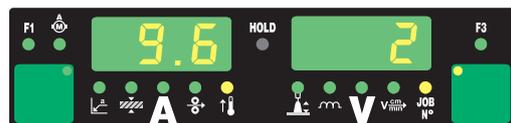
During welding you can switch to another job without stopping (e.g. in robot operation).

When you change to another process, Job mode is ended.

Copying/overwriting a job

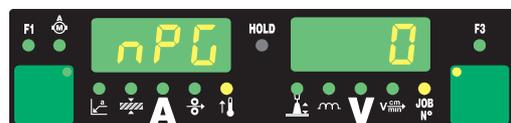
In Job mode you can copy a job that has already been saved to one program location to any other program location. To copy a job, proceed as follows:

- 1 Use the adjusting dial (1) to select which job you want to copy



- 2 Briefly press the Store button to change to the job menu

The first vacant program location for the job to be copied is indicated.



- 3 Select the desired program location with the adjusting dial, or else leave the suggested program location unchanged.



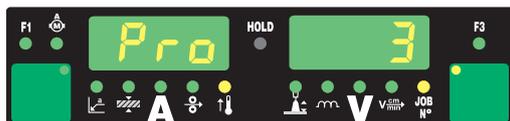
- 4 Press and hold the Store button

NOTE!

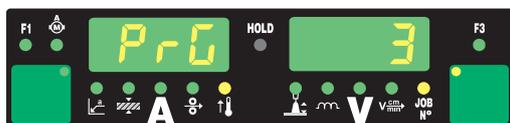
If the selected program location already has a job stored in it, then this existing job will be overwritten with the new job.

This action cannot be undone.

The left-hand digital display reads "Pro" - the job is copied to the program location you have just selected.

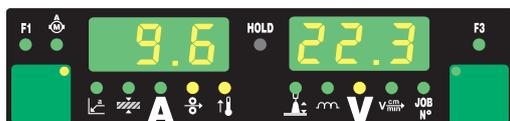


"PrG" appears on the left-hand digital display to indicate that the job has been copied.



- 5 Release the Store button.
6 Briefly press the Store button to exit from the Job menu

The power source switches to the setting selected before the job was copied.



Deleting a job

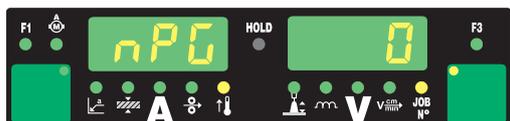
NOTE!

Jobs are deleted in the Job menu, not in the job mode process.

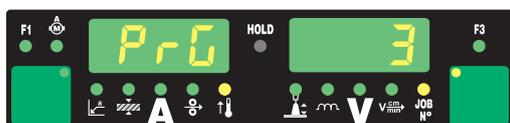
Stored jobs can also be deleted again. To delete a job, proceed as follows:

- 1 Briefly press the Store button to change to the job menu

The first vacant program location is shown.

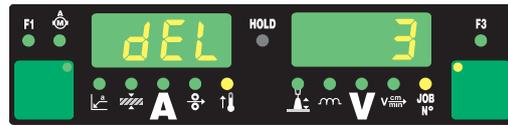


- 2 Using the adjusting dial, select the job to be deleted (the DEL symbol lights up on the wire diameter button).

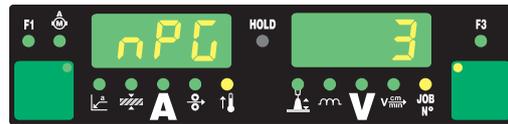


- 3 Press and hold the wire diameter button "DEL".

The left-hand display reads "dEL" - the job is deleted.

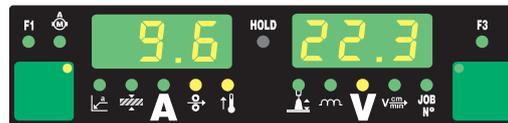


"PrG" appears on the left-hand digital display to indicate that the job has been deleted.



- 4 Release the wire diameter button "DEL".
5 Briefly press the Store button to exit from the Job menu

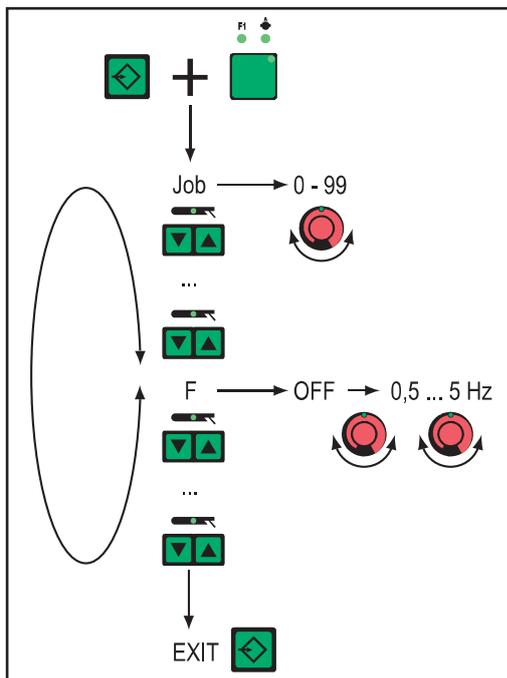
The power source switches to the setting selected before the job was deleted.



Setup settings

Job correction

General



Job correction menu: Overview

In the Job correction menu, setup parameters can be adapted to the specific requirements of individual jobs.

Opening the Job correction menu

- 1 Press and hold the Store button
- 2 Press the parameter selection button (left)
- 3 Release the Store button

The power source is now in the Job correction menu. The first parameter, "Job", is shown. The "Job" parameter is used to select the job for which the parameters are to be adjusted.

The job correction menu can also be opened using the following:

- RCU 4000 remote control
- Win RCU (JobExplorer software)
- ROB 4000/5000 robot interface
- Field bus systems

Changing welding parameters

- 1 Use the Process button to select the desired parameter
- 2 Use the adjusting dial to change the parameter value

Exiting the Job correction menu

- 1 Press the Store button

NOTE!

Any alterations are saved by exiting from the Job correction menu.

Parameters in the job correction menu

There are two types of parameter in the job correction menu:

permanently settable parameters:

- cannot be altered apart from in the job correction menu.
- can only be corrected in the job correction menu.

parameters that can be corrected at a later time:

- with boundary values for which an adjusting range can be defined
- within this adjusting range, these parameters can be corrected from the following control elements:
 - Control panel (Comfort, US, TIME 5000 Digital, CMT)
 - JobMaster welding torch
 - RCU 4000 remote control
 - Win RCU (JobExplorer software)

Permanently settable parameters

"Minimum" and "maximum" are used for setting ranges that differ according to power source, wire-feed unit, welding program, etc.

Job

Job whose parameters are to be adjusted

Unit

-

Setting range

0 - 99 = numbers of the programmed jobs
n = memory location vacant

Factory setting

-

P

Power correction - correction of the welding power as defined by the wire feed speed

Unit

m/min

ipm

Setting range

e.g.: 5 - 22

e.g.: 0.2 - 866.14

The setting range depends upon which job has been selected.

Factory setting

-

AL.1

Arc length correction 1 - general arc length correction

Unit

% (of welding voltage)

Setting range

± 30%

Factory setting

-

NOTE!

When the SynchroPulse option is enabled, AL.1 is the arc length correction for the lower operating point of the pulsed welding power. The arc length correction for the upper operating point is made using parameter AL.2.

dYn

dynamic - arc force dynamic correction for standard arcs or pulse correction for pulsed arcs.

The function of the "dyn" parameter corresponds to the droplet detachment correction/arc force dynamic correction/arc force dynamic parameter on the control panel, described under "Welding".

Unit	1
Setting range	± 5
Factory setting	-

GPr

Gas pre-flow time

Unit	s
Setting range	0 - 9.9
Factory setting	0.1

GPo

Gas post-flow time

Unit	s
Setting range	0 - 9.9
Factory setting	0.5

Fdc

Feeder creep - wire feeder creep speed

Unit	m/min	ipm
Setting range	AUT, OFF or 0.5 - max.	AUT, OFF or 19.69 - max.
	Additional possible setting with SFi option: SFi	
Factory setting	AUT	AUT

NOTE!

If Fdc is set to AUT, the value from the welding program database will be used.

If Fdc values are set manually and these values are faster than the wire feed speed that was set for the welding operation then the feeder creep speed is equal to the wire feed speed set for the welding operation.

Fdi

Feeder inching

Unit	m/min	ipm
Setting range	1 - max.	39.37 - max.
Factory setting	10	393.7

bbc

Burn-back time correction

Unit	s
Setting range	± 0.20
Factory setting	0

I-S

I (current) - Starting current

Unit	% (of starting current)
Setting range	0 - 200
Factory setting	135

SL

Slope

Unit	s
------	---

Setting range	0.1 - 9.9
Factory setting	1.0

I-E

I (current) - End - Final current

Unit	% (of starting current)
Setting range	0 - 200
Factory setting	50

t-S

time - Starting current - Starting current duration

Unit	s
Setting range	OFF or 0.1 - 9.9
Factory setting	OFF

t-E

time - End current - Final current duration

Unit	s
Setting range	OFF or 0.1 - 9.9
Factory setting	OFF

SPt

Spot welding time

Unit	s
Setting range	0.1 - 5.0
Factory setting	1.0

F

Frequency - for SynchroPulse option

Unit	Hz
Setting range	OFF or 0.5 - 5
Factory setting	OFF

dFd

delta Feeder - Welding power offset for the SynchroPulse option (defined by the wire feed speed)

Unit	m/min	ipm
Setting range	0.0 - 2.0	0.0 - 78.74
Factory setting	2,0	78.74

AL.2

Arc length correction 2 (for the upper operating point of the pulsed welding power with the SynchroPulse option)

Unit	% (of welding voltage)
Setting range	± 30
Factory setting	0

NOTE!

The arc length correction for the lower operating point is made using parameter AL.1.

tri	Trigger - subsequent correction of the mode: 2-step, 4-step, special 2-step, special 4-step, spot welding
Unit	-
Setting range	2-step, 4-step, special 4-step, spot welding
Factory setting	2-step

Parameters that can be corrected at a later time

NOTE!

During welding, the welding power (defined by the wire feed speed) or arc length can only be corrected as follows:

- ▶ via the control panel (Comfort, US, TIME 5000 Digital, CMT)
 - ▶ via the JobMaster welding torch
 - ▶ via the RCU 4000 remote control
 - ▶ via Win RCU (JobExplorer software)
 - ▶ within the defined boundaries (listed below for the parameters PcH, PcL and AL.c)
-

As long as the power source is switched on, the corrected parameter values remain saved. After the power source has been switched on again, the parameters are reset to the permanently settable values.

"Minimum" and "maximum" are used for setting ranges that differ according to power source, wire-feed unit, welding program, etc.

PcH

Power correction High - Correction boundary (high) for the welding power

Unit	% (of permanently settable parameter P - power correction)
Setting range	0 - 20
Factory setting	0

NOTE!

The maximum amount by which parameter P can be increased is the value set for PcL.

PcL

Power correction Low - Correction boundary (low) for the welding power

Unit	% (of permanently settable parameter P - power correction)
Setting range	0 - 20
Factory setting	0

NOTE!

The maximum amount by which parameter P can be decreased is the value set for PcL.

AL.c

Arc length correction (up or down)

Unit	% (of permanently settable parameter AL.1)
Setting range	0 - 30
Factory setting	0

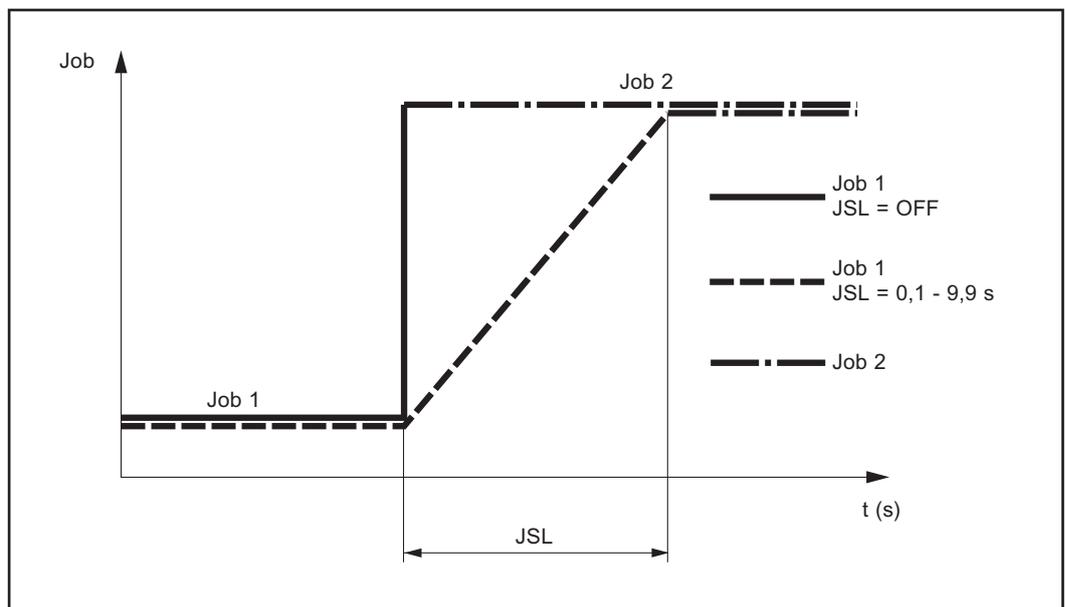
NOTE!

The maximum amount by which parameter AL.1 can be increased or decreased is the value specified for AL.c.

JSL

Job Slope - defines the time between the job that is currently selected and the next job

Unit	s
Setting range	OFF or 0.1 - 9.9
Factory setting	OFF



Job Slope

The value that has been set for Job Slope is stored along with the Job currently selected.

Shielding gas setup menu

General

The Protective gas shield setup menu provides easy access to the protective gas shield settings.

Protective gas shield setup menu for the standard control panel

Opening the Protective gas shield setup menu

- 1 Press and hold the Store button
- 2 Press the Gas test button
- 3 Release the Store button

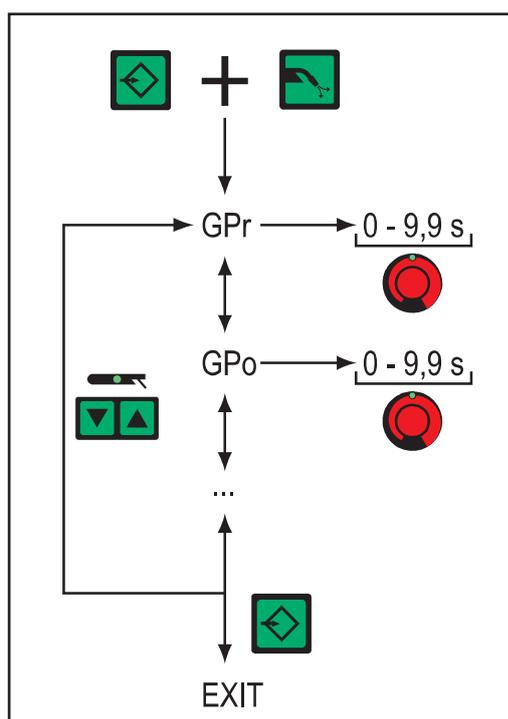
Changing welding parameters

- 4 Use the Material button to select the desired parameter
- 5 Alter the parameter value using the Mode button

Exiting the Setup menu

- 6 Press the Store button

Protective gas shield setup menu for the Comfort, US, TIME 5000 Digital and CMT control panels



Protective gas shield setup menu: Overview

Opening the Protective gas shield setup menu

- 1 Press and hold the Store button
- 2 Press the Gas test button
- 3 Release the Store button

The power source is now in the Protective gas shield setup menu - the last parameter that was selected is displayed.

Changing welding parameters

- 4 Use the Process button to select the desired parameter
- 5 Use the adjusting dial to change the parameter value

Exiting the Setup menu

- 6 Press the Store button

Welding parameters in the Protective gas shield setup menu

"Minimum" and "maximum" are used for setting ranges that differ according to power source, wire-feed unit, welding program, etc.

GPr	
Gas pre-flow time	
Unit	s
Setting range	0 - 9.9
Factory setting	0.1

GPo	
Gas post-flow time	
Unit	s
Setting range	0 - 9.9
Factory setting	0.5

GPU	
Gas purger	
Unit	min
Setting range	OFF or 0.1 - 10.0
Factory setting	OFF

Purging of the shielding gas begins as soon as GPU is allocated a value.

For safety reasons, purging of the shielding gas cannot be restarted until a new GPU value is entered.

NOTE!

Purging the shielding gas is necessary if condensation forms when the device is left unused in a cold environment for a prolonged period.
Long hosepacks are most affected.

GAS		
Gasflow - set value for shielding gas flow (digital gas control option)		
Unit	l/min	cfh
Setting range	OFF or 0.5 - max.	OFF or 10.71 - max.
Factory setting	15.0	32.14

NOTE!

Please refer to the “Digital Gas Control” operating instructions for more detailed explanations of the “GAS” parameter.

Setup menu for the standard control panel

General The Setup menu provides easy access to expert knowledge in the power source and to additional functions. The Setup menu can be used to make simple adjustments of the welding parameters to suit the various job settings.

Setup menu for the standard control panel

Opening the Protective gas shield setup menu

- 1 Press and hold the Store button
- 2 Press the Gas test button
- 3 Release the Store button

Changing welding parameters

- 4 Use the Material button to select the desired parameter
- 5 Alter the parameter value using the Mode button

Exiting the Setup menu

- 6 Press the Store button

Parameters in the Setup menu for the Standard control panel

NOTE!

The number of parameters available for the Standard control panel, and the order in which they are arranged, is not the same as in the extended setup menu structure found on the Comfort, US, TIME 5000 Digital and CMT control panels.

"Minimum" and "maximum" are used for setting ranges that differ according to power source, wire-feed unit, welding program, etc.

GPr

Gas pre-flow time

Unit	s
Setting range	0 - 9.9
Factory setting	0.1

GPo

Gas post-flow time

Unit	s
Setting range	0 - 9.9
Factory setting	0.5

Fdc

Feeder creep - wire feeder creep speed (only available when a push-pull unit is connected and the SFI option has been enabled)

Unit	m/min	ipm
Setting range	AUT, OFF or 0.5 - max.	AUT, OFF or 19.69 - max.
Factory setting	AUT	AUT

NOTE!

If Fdc is set to AUT, the value from the welding program database will be used.

If Fdc values are set manually and these values are faster than the wire feed speed that was set for the welding operation then the feeder creep speed is equal to the wire feed speed set for the welding operation.

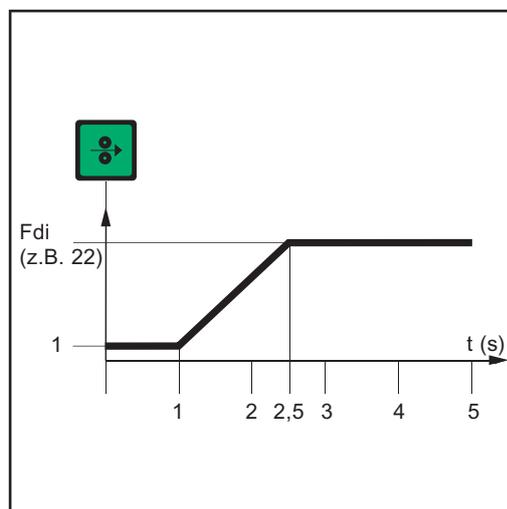
Fdi

Feeder inching

Unit	m/min	ipm
Setting range	1 - max.	39.37 - max.
Factory setting	10	393.7

NOTE!

To facilitate the exact positioning of the wire electrode, the following sequences are possible when the welder presses and holds the Feeder inching button down:



- Hold down the button for up to **one second** ... Irrespective of the value that has been set, the wire feed speed remains at 1 m/min or 39.37 ipm for the first second.
- Hold the button for up to **2.5 seconds** ... After one second, the wire feed speed increases at a uniform rate over the next 1.5 seconds.
- Hold the button for **longer than 2.5 seconds** ... After a total of 2.5 seconds, the wire is fed at a constant rate equal to the wire feed speed set for the Fdi welding parameter.

Passage over time of the wire feed speed when the feeder inching button is pressed and held down

If the Feeder inching button is released and pressed again before one second has elapsed, the sequence starts again from the beginning. This makes it possible to position the wire continuously at the low wire feed speed of 1 m/min or 39.37 ipm when necessary.

bbc

Burn-back time correction

Unit	s
Setting range	± 0.20
Factory setting	0

dYn

dynamic - Arc force dynamic correction

Unit	1
Setting range	± 5
Factory setting	-

I-S

I (current) - Starting current

Unit	% (of starting current)
Setting range	0 - 200
Factory setting	135

SL

Slope

Unit	s
Setting range	0.1 - 9.9
Factory setting	1.0

I-E

I (current) - End - Final current

Unit	% (of starting current)
Setting range	0 - 200
Factory setting	50

FAC

Reset power source to factory setting

Press and hold down the Store button for 2 s to restore the factory settings when "PrG" appears on the digital display, the power source has been reset

NOTE!

When the power source is reset, all the customised settings in the Setup menu are lost.

When the power source is reset, jobs are not deleted but are retained in the memory. The functions in the second level of the Setup menu (2nd) are also not deleted. Exception: Ignition time-out welding parameter (ito).

2nd

Second level of the Setup menu (see "Setup menu - level 2")

t-S

time - Starting current - Starting current duration

Unit	s
Setting range	OFF or 0.1 - 9.9
Factory setting	OFF

t-E

time - End current - Final current duration

Unit	s
Setting range	OFF or 0.1 - 9.9
Factory setting	OFF

Process setup menu

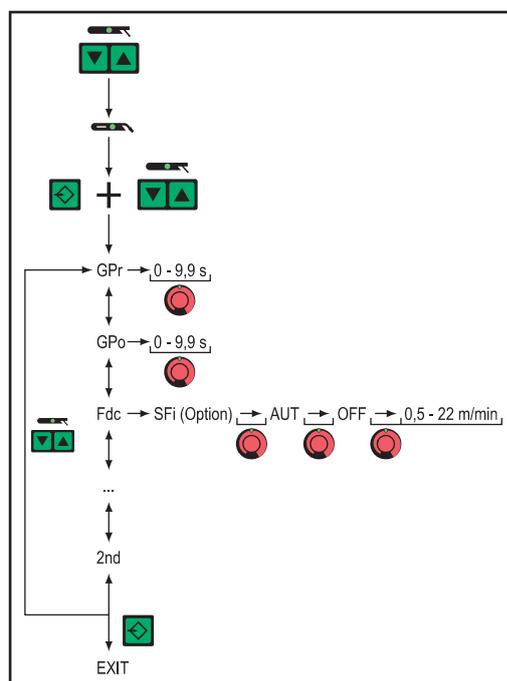
General

The Process setup menu provides simple access to expert knowledge in the power source and to additional functions. The Process setup menu can be used to make simple adjustments of the parameters to the various job settings.

The Process setup menu can be accessed using the Comfort, US, TIME 5000 Digital and CMT control panels.

Process setup menu for the Comfort, US, TIME 5000 Digital and CMT control panels

Setting process parameters is described here with reference to the MIG/MAG standard synergic welding process. The procedure for changing other process parameters is identical.



Process setup menu: Overview

Opening the Process setup menu

- 1 Use the Process button to select the "MIG/MAG Standard Synergic" welding process
- 2 Press and hold the Store button
- 3 Press the Process button
- 4 Release the Store button

The power source is now in the setup menu for the MIG/MAG standard synergic welding process - the last parameter that was selected is displayed.

Changing welding parameters

- 5 Use the Process button to select the desired parameter
- 6 Use the adjusting dial to change the parameter value

Exiting the Setup menu

- 7 Press the Store button

Parameters for MIG/MAG welding in the Process setup menu

The parameters available in the Process setup menu are described below for the following MIG/MAG welding processes:

- MIG/MAG pulse synergic welding
- MIG/MAG standard synergic welding
- MIG/MAG standard manual welding
- CMT welding
- TIME welding

"Minimum" and "maximum" are used for setting ranges that differ according to power source, wire-feed unit, welding program, etc.

GPr

Gas pre-flow time

Unit	s
Setting range	0 - 9.9
Factory setting	0.1

GPo

Gas post-flow time

Unit	s
Setting range	0 - 9.9
Factory setting	0.5

Fdc

Feeder creep - Wire feeder creep speed used with the SFi option

Unit	m/min	ipm
Setting range	AUT, OFF or 0.5 - max.	AUT, OFF or 19.69 - max.
Factory setting	AUT	AUT

NOTE!

If Fdc is set to AUT, the value from the welding program database will be used.

If Fdc values are set manually and these values are faster than the wire feed speed that was set for the welding operation then the feeder creep speed is equal to the wire feed speed set for the welding operation.

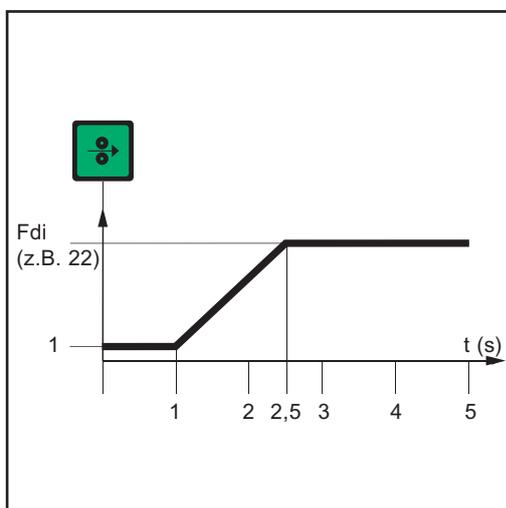
Fdi

Feeder inching

Unit	m/min	ipm
Setting range	1 - max.	39.37 - max.
Factory setting	10	393.7

NOTE!

To facilitate the exact positioning of the wire electrode, the following sequences are possible when the welder presses and holds the Feeder inching button down:



Passage over time of the wire feed speed when the feeder inching button is pressed and held down

- Hold down the button for up to **one second** ... Irrespective of the value that has been set, the wire feed speed remains at 1 m/min or 39.37 ipm for the first second.
- Hold the button for up to **2.5 seconds** ... After one second, the wire feed speed increases at a uniform rate over the next 1.5 seconds.
- Hold the button for **longer than 2.5 seconds** ... After a total of 2.5 seconds, the wire is fed at a constant rate equal to the wire feed speed set for the Fdi welding parameter.

If the Feeder inching button is released and pressed again before one second has elapsed, the sequence starts again from the beginning. This makes it possible to position the wire continuously at the low wire feed speed of 1 m/min or 39.37 ipm when necessary.

bbc

Burn-back time correction

Unit	s
Setting range	± 0.20
Factory setting	0

F

Frequency - for SynchroPulse option

Unit	Hz
Setting range	OFF or 0.5 - 5
Factory setting	OFF

NOTE!

In order to activate SynchroPulse, you must (as a minimum) change the value of the parameter F (frequency) from OFF to a value of between 0.5 Hz and 5Hz.

The parameters and the function of SynchroPulse are explained in more detail in the MIG/MAG welding section.

dFd

delta Feeder - Welding power offset for the SynchroPulse option (defined by the wire feed speed)

Unit	m/min	ipm
Setting range	0.0 - 2.0	0.0 - 78.74
Factory setting	2.0	78.74

AL.2

Arc length correction 2 (for the upper operating point of the pulsed welding power with the SynchroPulse option)

Unit	% (of welding voltage)
Setting range	± 30
Factory setting	0

NOTE!

The arc length correction for the lower operating point is made using parameter AL.1.

ALS

Arc length start - Increased welding voltage as striking voltage at welding startup, for MIG/MAG standard synergic welding. In conjunction with the Alt parameter explained below, ALS makes an optimised ignition sequence possible.

Unit	% (of welding voltage)
Setting range	0 - 100
Factory setting	0

Example

- ALS = 100 %
- Welding voltage currently set: 13 V
- Striking voltage: 13 V + 100 % = 26 V

ALt

Arc length time - Time for increased arc length via ALS. During time ALt there is a continuous decrease in the arc length to the currently set value.

Unit	s
Setting range	0 - 5
Factory setting	0

FAC

Reset power source to factory setting

Press and hold down the Store button for 2 s to restore the factory settings; when "PrG" appears on the digital display, the power source has been reset

NOTE!

When the power source is reset, all the customised settings in the Setup menu are lost.

When the power source is reset, jobs are not deleted but are retained in the memory. The functions in the second level of the Setup menu (2nd) are also not deleted. Exception: Ignition time-out welding parameter (ito).

2nd

Second level of the Setup menu (see "Setup menu - level 2")

**Parameters for
TIG welding in
the Process
setup menu**

2nd

Second level of the Setup menu (see "Setup menu - level 2")

**Parameters for
MMA welding in
the Process
setup menu**

NOTE!

If you reset the power source using the Factory parameter FAC, the hot-current time (Hti) and hot-start current (HCU) parameters are also reset.

Hti

Hot-current time

Unit	s
Setting range	0 - 2,0
Factory setting	0,5

HCU

Hot-start current

Unit	%
Setting range	0 - 200

Factory setting 150

2nd

Second level of the Setup menu (see "Setup menu - level 2")

Mode setup menu

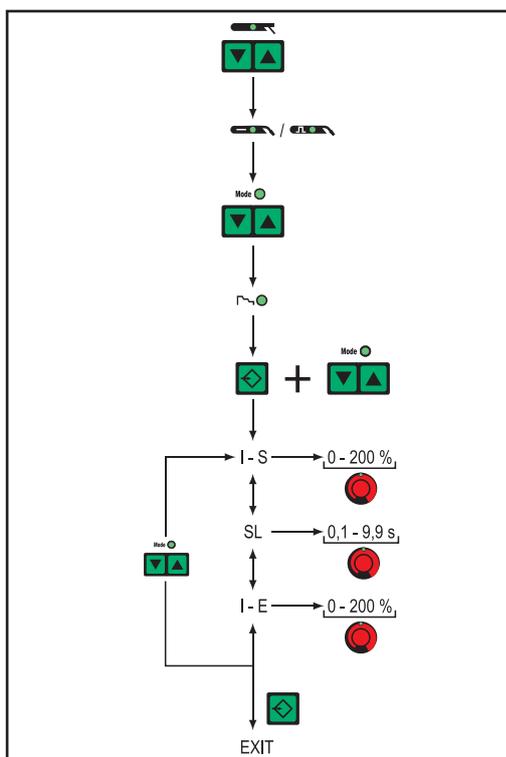
General

The Mode setup menu provides simple access to expert knowledge in the power source and to additional functions. The Mode setup menu can be used to make simple adjustments of the parameters to the various job settings.

The Process setup menu can be accessed using the Comfort, US, TIME 5000 Digital and CMT control panels.

Mode setup menu for the Comfort, US, TIME 5000 Digital and CMT control panels

Setting the Mode parameters is described by reference to "Special 4-step" mode. The procedure for changing other Mode parameters is identical.



Mode setup menu: Overview

Enter the Mode setup menu

- 1 Use the Process button to select MIG/MAG standard synergic welding or MIG/MAG pulse synergic welding
- 2 Use the Mode button to select "Special 4-step" mode
- 3 Press and hold the Store button
- 4 Press the Mode button
- 5 Release the Store button

The power source is now in the setup menu for "Special 4-step" mode - the last parameter that was called is displayed.

Changing welding parameters

- 4 Use the Mode button to select the desired parameter
- 5 Use the adjusting dial to change the parameter value

Exiting the Setup menu

- 6 Press the Store button

Welding parameters for "Special 2-step mode" in the Mode setup menu

"Minimum" and "maximum" are used for setting ranges that differ according to power source, wire-feed unit, welding program, etc.

I-S

I (current) - Starting current

Unit % (of starting current)

Setting range 0 - 200

Factory setting 135

SL	
Slope	
Unit	s
Setting range	0.1 - 9.9
Factory setting	1.0

I-E	
I (current) - End - Final current	
Unit	% (of starting current)
Setting range	0 - 200
Factory setting	50

t-S	
time - Starting current - Starting current duration	
Unit	s
Setting range	OFF or 0.1 - 9.9
Factory setting	OFF

t-E	
time - End current - Final current duration	
Unit	s
Setting range	OFF or 0.1 - 9.9
Factory setting	OFF

In the MIG/MAG welding section, the parameters for "Special 2-step mode for robot interface" are illustrated by means of a diagram.

Welding parameters for "Special 4-step mode" in the Mode setup menu

I-S	
I (current) - Starting current	
Unit	% (of starting current)
Setting range	0 - 200
Factory setting	135

SL	
Slope	
Unit	s
Setting range	0.1 - 9.9
Factory setting	1.0

I-E	
I (current) - End - Final current	
Unit	% (of starting current)
Setting range	0 - 200
Factory setting	50

**Parameters for
spot welding in
the Mode setup
menu**

SPT	
Spot welding time	
Unit	s
Setting range	0.1 - 5.0
Factory setting	1.0

Setup menu - Level 2

General

The following functions are located in a second menu level:

- PPU (push-pull unit)
- C-C (cooling unit cut-out)
- Stc (wire-stick - only where there is a robot interface)
- lto (ignition time-out)
- Arc (arc break watchdog)
- S4t (gun trigger option)
- Gun (option for changing between modes with the JobMaster welding torch)
- r (welding circuit resistance measurement)
- L (welding circuit inductivity display)
- Eln (characteristic selection - not on standard control panel)
- ASt (Anti-stick - not on standard control panel)
- COr (gas correction for digital gas control option)
- EnE (Real Energy Input)

Setup menu level 2 for the Standard control panel

Changing to the second menu level (2nd)

- 1 Access the Setup menu for the Standard control panel
- 2 Select "2nd" welding parameter
- 3 Press and hold the Store button
- 4 Press the Mode button
- 5 Release the Store button

The power source is now in the second menu level (2nd) of the Setup menu. The function "PPU" (push-pull unit) is displayed.

Selecting the function

- 6 Use the Material button to select the desired function
- 7 Make the settings for this function with the Mode button

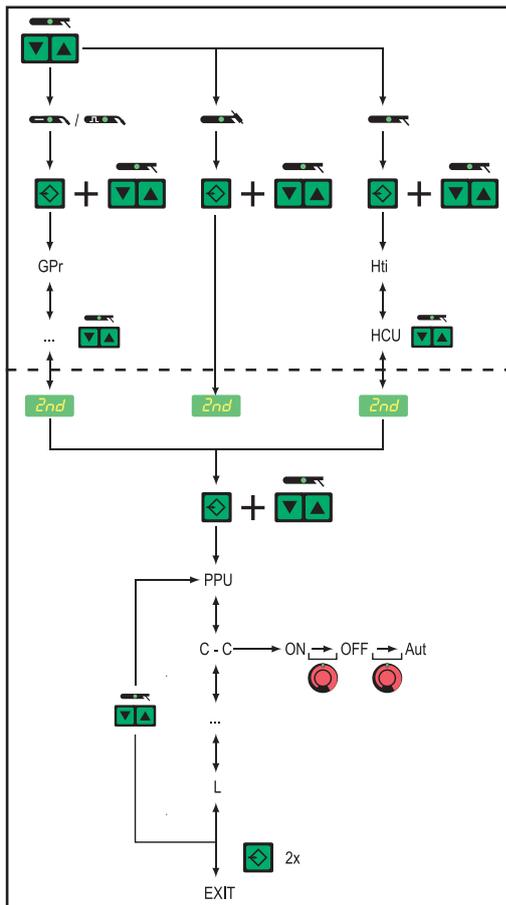
Exiting from the second menu level (2nd)

- 8 Press the Store button

The power source is now in the Setup menu for the Standard control panel.

- 9 To exit from the Setup menu for the Standard control panel press the Store button again

Setup menu level 2 for the Comfort, US, TIME 5000 Digital and CMT control panels



Setup menu: level 2: Overview (with reference to MIG/MAG standard synergic welding)

Changing to the second menu level (2nd)

- 1 Open the Process setup menu
- 2 Select "2nd" welding parameter
- 3 Press and hold the Store button
- 4 Press the Process button
- 5 Release the Store button

The power source is now in the second menu level (2nd) of the Setup menu. The function "PPU" (push-pull unit) is displayed.

Selecting the function

- 6 Use the Process button to select the desired function
- 7 Set the function with the adjusting dial

Exiting from the second menu level (2nd)

- 8 Press the Store button

The power source is now in the Process setup menu.

- 9 To exit from the Process setup menu, press the Store button again

Parameters for MIG/MAG welding in the Setup menu level 2

PPU

Push-pull unit (see "Calibrating the push-pull unit")

C-C

Cooling unit control

Unit

-

Setting range

AUT, ON, OFF

Factory setting

AUT

AUT: The cooling unit cuts out after a 2-minute welding off-time

NOTE!

If the "FK 4000 thermostat" option has been installed in the cooling unit, the cooling unit cuts out as soon as the return temperature has dropped below 50°C, but no sooner than after a 2-minute welding off-time.

ON: The cooling unit is permanently ON

OFF: The cooling unit is permanently OFF

If an FK 9000 cooling unit is used, the only possible settings are ON and OFF.

NOTE!

Parameter C-C can be set differently for MIG/MAG welding and TIG welding.

Example:

- MIG/MAG welding process... e.g. use of a water-cooled welding torch: C-C = AUT
 - TIG welding process... e.g. use of a gas-cooled welding torch: C-C = OFF
-

C-t

Cooling time – time from when the flow watchdog is triggered until the "no | H2O" service code is output. For example, if there are air bubbles in the cooling system, the cooling unit will not cut out until the end of this pre-set time.

Unit	s
Setting range	5 - 25
Factory setting	10

NOTE!

Every time the power source is switched on, the cooling unit carries out a test run for 180 seconds.

Stc

Wire-stick control

Unit	-
Setting range	OFF, ON
Factory setting	OFF

The parameters for the wire-stick function (Stc) are available when a robot interface or field bus coupler for robot control is connected to the LocalNet.

The wire-stick control function (Stc) is described in the "Robot welding" section.

Ito

Ignition time-out - Length of wire that is fed before the safety cut-out is triggered

Unit	mm	in.
Setting range	OFF or 5 - 100	OFF or 0.20 - 3.94
Factory setting	OFF	

NOTE!

The "Ignition time-out" function (ito) is a safety function.

The length of wire that is fed before the safety cut-out trips may differ from the pre-set wire length, particularly when the wire is being fed at fast wire feed speeds.

The "Ignition time-out" function (ito) is explained in the "Special functions and options" section.

Arc

Arc - Arc break watchdog

Unit	s
Setting range	OFF (arc break watchdog is deactivated); 0.01 - 2 (arc break watchdog is activated)
Factory setting	OFF

The “Arc break watchdog” function (Arc) is explained in the “Special functions and options” section.

FCO

Feeder control - Wire-feed unit cut-out (wire end sensor option)

Unit	-
Setting range	OFF/ON/noE
Factory setting	OFF

OFF: The power source halts wire feed when the wire end sensor is triggered. "Err|056" appears on the display.

ON: The power sources halts wire feed after completion of the current weld seam when the wire-end sensor is triggered. "Err|056" appears on the display.

Acknowledge Err | 056

Insert a new wirepool and feed the wire electrode into the hosepack

noE: The power source does not halt wire feed when the wire end sensor is triggered. The wire end alarm is not displayed and is only transmitted to the robot control via the field bus.

NOTE!

The "noE" setting only functions in conjunction with the field bus applications.

Robot interfaces ROB 4000/5000 do not support this function.

SEt

Setting - Country-specific setting (Standard/USA)... Std/US

Unit	-
Setting range	Std, US (Standard/USA)
Factory setting	Standard version: Std (measurements: cm/mm) USA version: US (measurements in inches)

S4t

Special 4-step - Gun trigger (option)
Switch between jobs using torch trigger

Unit	-
Setting range	0, 1 (Off, On)
Factory setting	1

Gun

Gun (welding torch) - Changing between modes with the JobMaster torch (optional)

Unit	-
Setting range	0, 1 (Off, On)
Factory setting	1

NOTE!

The “Gun Trigger” (S4t) and “Changing between modes with the JobMaster welding torch” (Gun) options are explained in more detail in the “GunTrigger” operating instructions.

S2t

Special 2-step (US control panel only) - for selecting jobs and groups by pressing the torch trigger

Press once (< 0,5 s)... next job in a group is selected

Press twice (< 0,5 s)... next group is selected

r

r (resistance) - Welding circuit resistance (in mW)

see "Measuring welding circuit resistance r"

L

L (inductivity) - Welding circuit inductivity (in microhenry)

see "Displaying welding circuit inductivity L"

COr

Correction - Gas correction ("Digital gas control" option)

Unit -

Setting range AUT/1.0 - 10.0

Factory setting AUT

NOTE!

Please refer to "Digital gas control" operating instructions for more detailed explanations of the "COr" parameter.

EnE

Real Energy Input – electrical energy of the arc relative to the welding speed

Unit kJ

Setting range ON/OFF

Factory setting OFF

Since the full range of values (1 kJ - 99999 kJ) cannot be displayed on the three-digit display, the following display format has been selected:

Value in kJ	Indicator on display
1 to 999	1 to 999
1000 to 9999	1.00 bis 9.99 (without the unit digit, e.g. 5270 kJ -> 5.27)
10000 to 99999	10.0 bis 99.9 (without the unit digit and the tens digit, e.g. 23580 kJ -> 23.6)

Parameters for operating power sources in parallel in the Setup menu level 2**P-C**

Power Control - for defining the Master or Slave power sources when two power sources are operated in parallel

Unit -

Setting range On (Master power source), OFF (Slave power source)

Factory setting OFF

NOTE!

The P-C parameter is only available when two power sources are connected via an LHSB (LocalNet High-Speed Bus).

Parameters for TimeTwin Digital in the Setup menu level 2

T-C	
Twin Control - for defining the leading or trailing power sources in the TimeTwin Digital process	
Unit	-
Setting range	On (Leading power source), OFF (Trailing power source)
Factory setting	-

The T-C parameter is only available when two power sources are connected via an LHSB (LocalNet High-Speed Bus) and the "TimeTwin Digital" option has been enabled.

NOTE!

When a robot interface is connected to the power source, the T-C parameter can only be adjusted via the robot interface.

Parameters for TIG welding in the Setup menu level 2

C-C	
Cooling unit control	
Unit	-
Setting range	AUT, ON, OFF
Factory setting	AUT

AUT: The cooling unit cuts out after a 2-minute welding off-time

NOTE!

If the "FK 4000 thermostat" option has been installed in the cooling unit, the cooling unit cuts out as soon as the return temperature has dropped below 50°C, but no sooner than after a 2-minute welding off-time.

ON: The cooling unit is permanently ON

OFF: The cooling unit is permanently OFF

If an FK 9000 cooling unit is used, the only possible settings are ON and OFF.

NOTE!

Parameter C-C can be set differently for MIG/MAG welding and TIG welding.

Example:

- MIG/MAG welding process ... e.g. use of a water-cooled welding torch: C-C = AUT
- TIG welding process ... e.g. use of a gas-cooled welding torch: C-C = OFF

CSS	
Comfort stop sensitivity - Sensitivity of the response characteristic of the TIG comfort stop function	
Unit	-
Setting range	0.5 - 5.0 or OFF
Factory setting	OFF

NOTE!

A standard value setting of 2.

0 is recommended for the CSS parameter. However, if the welding process is frequently stopped unintentionally, increase the value for the CSS parameter.

Depending on the value of the CSS parameter, it may be necessary to lengthen the arc to trigger the TIG comfort stop function:

- when CSS = 0.5 - 2.0 small increase in the size of the arc
- when CSS = 2.0 - 3.5 medium increase in the size of the arc
- when CSS = 3.5 - 5.0 large increase in the size of the arc

r

r (resistance) - Welding circuit resistance (in mW)
see "Measuring welding circuit resistance r"

L

L (inductivity) - Welding circuit inductivity (in microhenry)
see "Displaying welding circuit inductivity L"

COr

Correction - Gas correction ("Digital gas control" option)

Unit	-
Setting range	AUT / 1.0 - 10.0
Factory setting	AUT

NOTE!

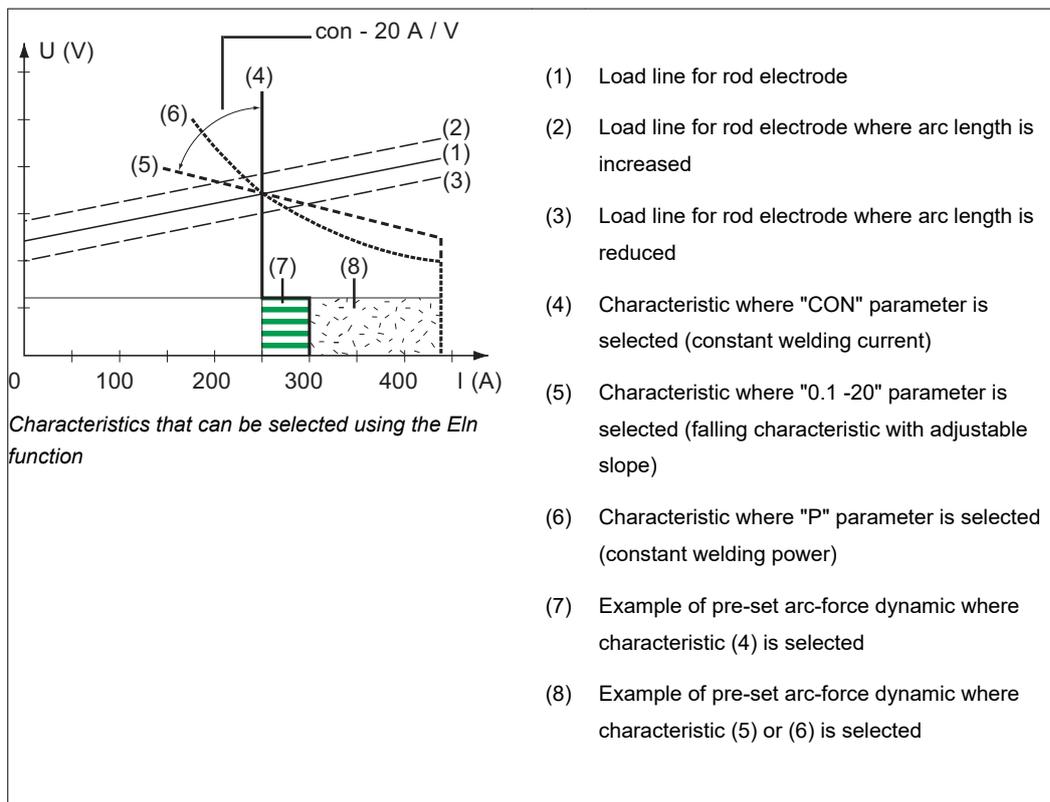
Please refer to "Digital Gas Control" operating instructions for more detailed explanations of the "COr" parameter.

Parameters for rod electrode (MMA) welding in the Setup menu level 2

EIn

Electrode line - characteristic selection

Unit	1
Setting range	CON or 0.1 - 20 or P
Factory setting	CON



"con" parameter (constant welding current)

- If the "con" parameter is set, the welding current will be kept constant, irrespective of the welding voltage. This results in a vertical characteristic (4).
- The "con" parameter is especially suitable for rutile electrodes and basic electrodes, as well as for gouging.
- For arc air gouging, set the arc-force dynamic to "100".

Parameter "0.1 - 20" (falling characteristic with adjustable slope)

- Parameter "0.1 - 20" is used to set a falling characteristic (5). The setting range extends from 0.1 A / V (very steep) to 20 A / V (very flat).
- Setting a flat characteristic (5) is only advisable for cellulose electrodes.

NOTE!

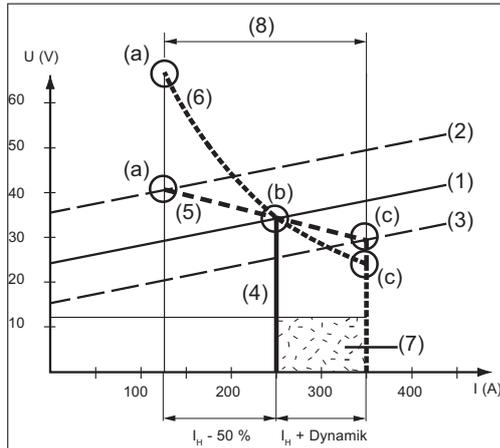
When setting a flat characteristic (5), set the arc-force dynamic to a higher value.

"P" parameter (constant welding power)

- If the "P" parameter is set, the welding power is kept constant, irrespective of the welding voltage and welding current. This results in a hyperbolic characteristic (6).
- The "P" parameter is particularly suitable for cellulose electrodes.

NOTE!

If there are problems with a rod electrode tending to "stick", set the arc-force dynamic to a higher value.



Settings example: $I_H = 250 \text{ A}$, arc-force dynamic = 50

- (1) Load line for rod electrode
- (2) Load line for rod electrode where arc length is increased
- (3) Load line for rod electrode where arc length is reduced
- (4) Characteristic where "CON" parameter is selected (constant welding current)
- (5) Characteristic where "0.1 -20" parameter is selected (falling characteristic with adjustable slope)
- (6) Characteristic where "P" parameter is selected (constant welding power)
- (7) Example of pre-set arc-force dynamic where characteristic (5) or (6) is selected
- (8) Possible change in the current where characteristic (5) or (6) is selected, as a function of the welding voltage (arc length)
- (a) Operating point where arc length is long
- (b) Operating point when welding current I_H is set
- (c) Operating point where arc length is short

The characteristics (4), (5) and (6) shown here apply when using a rod electrode whose characteristic corresponds - at a given arc length - to the load line (1).

Depending on what welding current (I) has been set, the point of intersection (operating point) of characteristics (4), (5) and (6) will be displaced along the load line (1). The operating point provides information on the actual welding voltage and the actual welding current.

Where the welding current (I_H) is permanently set, the operating point may migrate along the characteristics (4), (5) and (6) according to the welding voltage at a given moment. The welding voltage U is dependent upon the length of the arc.

If the arc length changes (e.g. in accordance with the load line (2)) the resulting operating point will be the point where the corresponding characteristic (4), (5) or (6) intersects with the load line (2).

Applies to characteristics (5) and (6): Depending upon the welding voltage (arc length), the welding current (I) will also become either smaller or larger, even though the value set for I_H remains the same.

r
 r (resistance) - Welding circuit resistance (in mW)
 see "Measuring welding circuit resistance r"

L
 L (inductivity) - Welding circuit inductivity (in microhenry)
 see "Displaying welding circuit inductivity L"

ASt	
Anti-stick	
Unit	-
Setting range	ON, OFF
Factory setting	OFF

Uco	
U (Voltage) cut-off - Welding voltage limitation:	
Unit	V
Setting range	OFF or 5 - 95
Factory setting	OFF

NOTE!

The arc length depends on the welding voltage.

To end the welding process, it is usually necessary to significantly lift the rod electrode away from the workpiece. With the "Uco" parameter, the welding voltage can be limited to a value that makes it possible to end the welding operation simply by slightly lifting the rod electrode.

If the welding process is stopped unintentionally during the welding, increase the value for the Uco parameter.

Notes on the use of the FAC parameter

The following parameters in Setup menu level 2 are not reset to the factory setting when the FAC parameter is used:

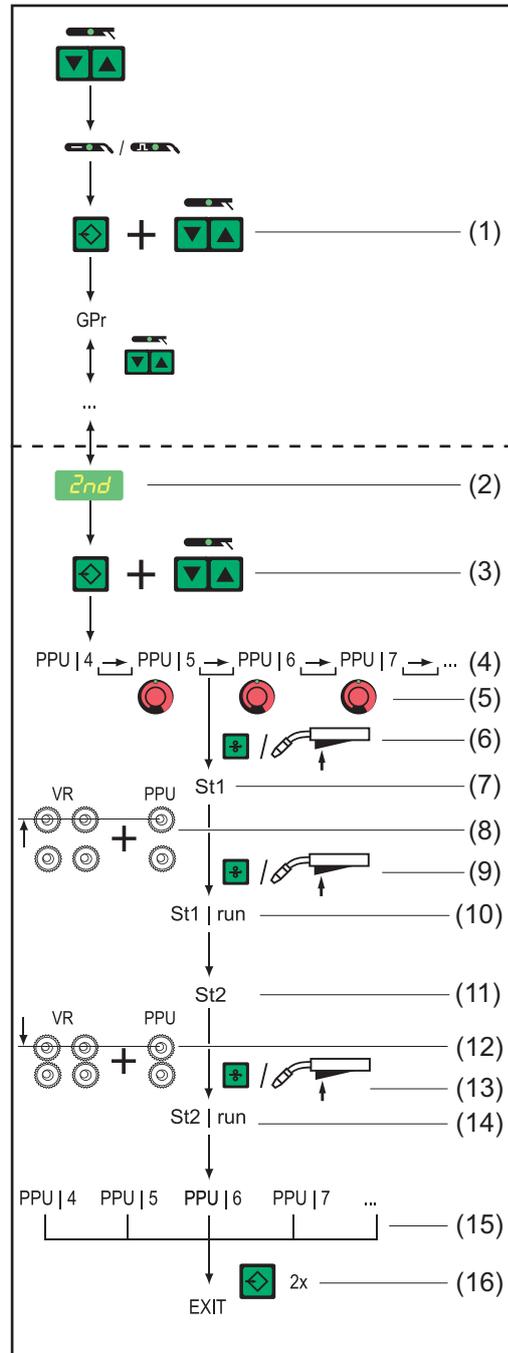
- PPU
- C-C
- Stc
- Arc
- S4t
- Gun

Calibrating push-pull unit

General

The push-pull unit must be calibrated before it is started up for the first time and whenever the wirefeed software is updated. If the push-pull unit is not calibrated, standard parameters will be used - which may lead to an unsatisfactory welding result.

Calibrating the push-pull unit - overview



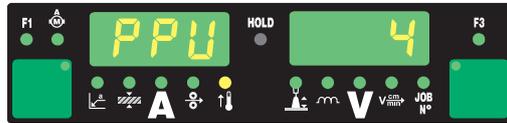
- (1) Access Setup menu: Level 1
- (2) Select "Parameter 2nd"
- (3) Press and hold the Store button
Press the Process button
Release the Store button
- (4) Select the "PPU" function
- (5) Use the adjusting dial to select the corresponding push-pull unit
- (6) Press the Feeder inching button or the torch trigger ...
- (7) ... "St1" is shown on the display
- (8) Disengage the drive units
- (9) Press the Feeder inching button or the torch trigger ...
- (10) ... "St1 | run" is shown on the display
- (11) ... "St2" is shown on the display
- (12) Engage the drive units
- (13) Press the Feeder inching button or the torch trigger ...
- (14) ... "St2 | run" is shown on the display
- (15) The calibration operation on the push-pull unit is finished
- (16) Press the Store button

Calibrating the push-pull unit using the Comfort control panel: Overview

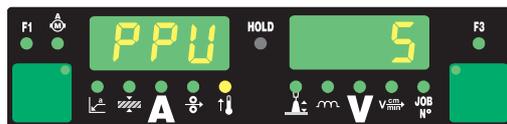
Calibrating the push-pull unit

For an overview of the error messages that may occur during calibration of the push-pull unit, please refer to "Service codes for push-pull calibration".

- 1 Open the Set-up menu level 2 (2nd)
- 2 Select parameter PPU



- 3 Select the corresponding push-pull unit from the list:
 - using the adjusting dial
 - using the Mode button on the Standard control panel



NOTE!

The types of push-pull unit that can be selected depend upon the control board fitted in the wire-feed unit.

The control board designation can be found in the spare parts list for the wire-feed unit.

No.	Push-pull unit	PC board	
		SR41	SR43
0	Fronius unreeling device "VR 1530-22" 22 m/min / 865 ipm ¹⁾	x	
1	Fronius unreeling device "VR 1530-30" 30 m/min / 1180 ipm (value displayed on the digital display: 1.18) ¹⁾	x	
2	Fronius robot push-pull "KD Drive" 10 m/min / 393.70 ipm ¹⁾	x	x
3	Fronius robot push-pull "Robacta Drive" (Master control) ¹⁾ Use with long torch hosepacks of 3.5 - 8 m (11 ft. 5.80 in. - 26 ft. 2.96 in.) in conjunction with a short lead from the wirepool, welding wire drum or large wire-feed unit spool to the wire-feed unit of 1.5 - 3 m (4 ft. 11.06 in. - 9 ft. 10.11 in.) Recommended feed rollers: 4 x half-round slot	x	x
4	Fronius robot push-pull "Robacta Drive" (slave control) Application: <ul style="list-style-type: none"> - with short torch hosepacks of 1.5 - 3.5 m (4ft. 11.06 in. - 9 ft. 10.11 in.) in conjunction with a long lead from the wirepool, welding wire drum or large wire-feed unit spool to wire-feed unit of 3 - 10 m (9 ft. 10.11 in. - 32 ft. 9.70 in.) - in SynchroPulse mode 	x	x
5	Fronius manual push-pull "PullMig" with power potentiometer	x	x
6	Fronius manual push-pull "PullMig" without power potentiometer	x	x
7	Binzel manual push-pull 42 V with power potentiometer	x	

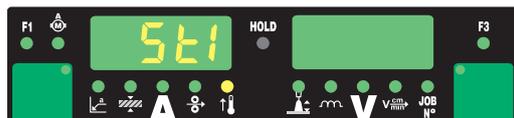
No.	Push-pull unit	PC board	
		SR41	SR43
8	Binzel manual push-pull 42 V without power potentiometer	x	
9	Binzel robot push-pull 42 V ²⁾	x	
10	Binzel robot push-pull 24 V	x	
11	Dinse robot push-pull 42 V	x	
12	Hulftegger manual push-pull 24 V	x	
13	Fronius "VR 143-2" intermediate drive	x	
14	Fronius unreeling device "MS" 22 m/min / 865 ipm ¹⁾	x	
16	"Cobra Gold" manual push-pull 24 V	x	x
20	Fronius unreeling device "VR 1530-12" 12 m/min / 470 ipm ¹⁾	x	
23	Binzel robot push-pull 32 V	x	
24	Dinse new robot push-pull 42V	x	
27	Robacta Drive CMT		x
28	PullMig CMT with up/down button (CMT manual)		x
29	PullMig CMT without up/down button (CMT manual)		x
32	Robacta Powerdrive, 22 m/min		x
33	Elvi, 25 m/min, 500 mA, slave		x
34	Elvi, 25 m/min, 900 mA, slave		x
35	Robacta Powerdrive, 10 m/min		x
50	Fronius manual push-pull "PT Drive" (d=0.8 mm / 0.030 in.; material: aluminium) ³⁾	x	
51	Fronius manual push-pull "PT Drive" (d=1.0 mm / 0.040 in.; material: aluminium) ³⁾	x	
52	Fronius manual push-pull "PT Drive" (d=1.2 mm / 0.045 in.; material: aluminium) ³⁾	x	
53	Fronius manual push-pull "PT Drive" (d=1.6 mm / 1/16 in.; material: aluminium) ³⁾	x	
54	Binzel robot push-pull "Master Feeder BG II" ^{1) 3)}	x	
55	Fronius "VR 1530 PD" unreeling device (d = 1.0 mm / 0.040 in.; material: steel) ³⁾	x	
56	Fronius "VR 1530 PD" unreeling device (d = 1.2 mm / 0.045 in.; material: steel) ³⁾	x	
57	Fronius "VR 1530 PD" unreeling device (d = 1.6 mm / 1/16 in.; material: steel) ³⁾	x	
59	Fronius manual push-pull "PT Drive" (d=1.0 mm / 0.040 in.; materials: steel, CrNi, CuSi3) ³⁾	x	
60	Fronius manual push-pull "PT Drive" (d=1.2 mm / 0.045 in.; materials: steel, CrNi) ³⁾	x	
61	Fronius manual push-pull "PT Drive" (d=0.8 mm / 0.030 in.; materials: steel, CrNi) ³⁾	x	
62	Binzel robot push-pull 32V with IWG ^{1) 3)}	x	

No. Push-pull unit	PC board	
	SR41	SR43

- 1) No calibration under load (St2) is required
- 3) Software enabling required

- 4] Press the "Feeder inching" button or the torch trigger

"St1" is displayed on the left-hand digital display



- 5] Disengage the drive units of both wire-feed unit motors (e.g. welding torch and wire-feed unit) - the wire-feed unit motors must not be under load (push-pull calibration - open circuit)

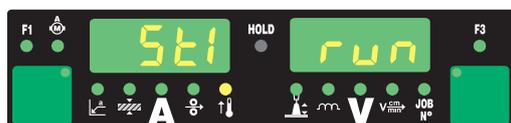
CAUTION!

Risk of injury from rotating cogs and drive parts.

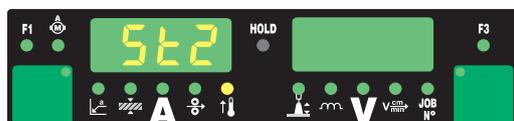
Keep hands away from rotating cogs and the wire drive.

- 6] Press the "Feeder inching" button or the torch trigger

The wire-feed unit motors are calibrated while not under load. During the calibration process "run" is displayed on the right-hand digital display



Once the calibration - in the unloaded state - has been completed, the digital display will read "St2".



- 7] Engage the drive units of both wire-feed unit motors (e.g. welding torch and wire-feed unit) once again - the wire-feed unit motors must be under load (push-pull calibration - engaged)

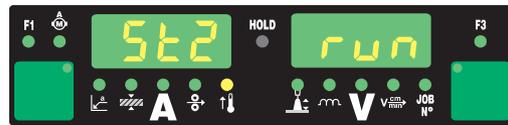
CAUTION!

Risk of injury from wire electrode emerging at speed and from rotating cogs and drive parts.

Hold the welding torch so that it points away from your face and body. Keep hands away from rotating cogs and the wire drive.

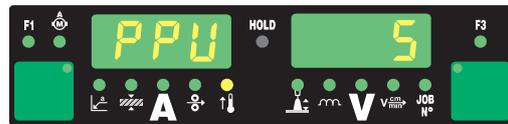
- 8 Press the "Feeder inching" button or the torch trigger

The wire-feed unit motors are calibrated while under load. During the calibration process "run" is displayed on the right-hand digital display.



If the push-pull unit does not need to be calibrated while under load (St2), the previously set values (e.g. "PPU" and "5") will appear on the digital display when you press the Feeder inching button or torch trigger.

Calibration of the push-pull unit is complete when the previously set values - e.g. "PPU" and "5" - reappear on the digital display.



- 9 Press the Store button twice to exit from the set-up menu

Service codes for push-pull calibration

Safety



WARNING!

An electric shock can be fatal.

Before opening the device

- ▶ Turn the mains switch to the "O" position
- ▶ Unplug the device from the mains
- ▶ Ensure the device cannot be switched back on
- ▶ Using a suitable measuring instrument, check to make sure that electrically charged components (e.g. capacitors) have been discharged

Service codes when the drive units are disengaged ("open-circuit" calibration)

Err | Eto

Cause: Incorrect measurement during push-pull calibration

Remedy: Repeat push-pull calibration

St1 | E 1

Cause: At minimum wire feed speed, the wire-feed unit motor does not deliver any actual rotational speed value.

Remedy: Repeat the push-pull calibration. If the error message re-appears: Contact After-Sales Service.

St1 | E 2

Cause: At maximum wire feed speed, the wire-feed motor does not deliver any actual rotational speed value.

Remedy: Repeat the push-pull calibration. If the error message re-appears: Contact After-Sales Service.

St1 | E 3

Cause: At minimum wire feed speed, the wire-feed unit motor does not deliver any actual rotational speed value.

Remedy: Repeat the push-pull calibration. If the error message re-appears: Contact After-Sales Service.

St1 | E 4

Cause: At minimum wire feed speed, the wire-feed unit motor does not deliver any actual rotational speed value.

Remedy: Repeat the push-pull calibration. If the error message re-appears: Contact After-Sales Service.

St1 | E 5

Cause: At maximum wire feed speed, the wire-feed motor does not deliver any actual rotational speed value.

Remedy: Repeat the push-pull calibration. If the error message re-appears: Contact After-Sales Service.

St1 | E 6

Cause: At maximum wire feed speed, the wire-feed motor does not deliver any actual rotational speed value.

Remedy: Repeat the push-pull calibration. If the error message re-appears: Contact After-Sales Service.

Service codes when the drive units are engaged ("engaged" calibration)

St1 | E 16

Cause: Push-pull calibration was interrupted: Quick-stop was activated by pressing the torch trigger.

Remedy: Repeat push-pull calibration

St2 | E 7

Cause: "Push-pull calibration - open-circuit" has not been carried out

Remedy: Carry out "push-pull calibration - open-circuit"

St2 | E 8

Cause: At minimum wire feed speed, the wire-feed unit motor does not deliver any actual rotational speed value.

Remedy: Repeat the push-pull calibration. If the error message re-appears: Contact After-Sales Service.

St2 | E 9

Cause: At minimum wire feed speed, the motor of the push-pull unit does not deliver any actual rotational speed value.

Remedy: Repeat the push-pull calibration. If the error message re-appears: Contact After-Sales Service.

St2 | E 10

Cause: At minimum wire feed speed, the motor current of the wire-feed unit motor is outside the permitted range. Possible reasons are disengaged wire-feed unit motors or wire feed problems.

Remedy: Engage the drive units of both wire-feed unit motors, arrange the hosepack in as straight a line as possible; check the inner liner for kinks or soiling; check the contact pressure on the 2-roller or 4-roller drive of the push-pull unit. Repeat the push-pull calibration. If the error message re-appears: Contact After-Sales Service.

St2 | E 11

Cause: At minimum wire feed speed, the motor current of the push-pull unit is outside the permitted range. Possible reasons are disengaged wire-feed unit motors or wire feed problems.

Remedy: Engage the drive units of both wire-feed unit motors, arrange the hosepack in as straight a line as possible; check the inner liner for kinks or soiling; check the contact pressure on the 2-roller or 4-roller drive of the push-pull unit. Repeat the push-pull calibration. If the error message re-appears: Contact After-Sales Service.

St2 | E 12

Cause: At maximum wire feed speed, the wire-feed motor does not deliver any actual rotational speed value.

Remedy: Repeat the push-pull calibration. If the error message re-appears: Contact After-Sales Service.

St2 | E 13

Cause: At maximum wire feed speed, the motor of the push-pull unit does not deliver any actual rotational speed value.

Remedy: Repeat the push-pull calibration. If the error message re-appears: Contact After-Sales Service (faulty actual-value pick-up)

St2 | E 14

Cause: At maximum wire feed speed, the motor current of the wire-feed unit motor is outside the permitted range. Possible reasons are disengaged wire-feed unit motors or wire feed problems.

Remedy: Engage the drive units of both wire-feed unit motors, arrange the hosepack in as straight a line as possible; check the inner liner for kinks or soiling; check the contact pressure on the 2-roller or 4-roller drive of the push-pull unit. Repeat the push-pull calibration. If the error message re-appears: Contact After-Sales Service

St2 | E 15

Cause: At maximum wire feed speed, the motor current of the push-pull unit is outside the permitted range. Possible reasons are disengaged wire-feed unit motors or wire feed problems.

Remedy: Engage the drive units of both wire-feed unit motors, arrange the hosepack in as straight a line as possible; check the inner liner for kinks or soiling; check the contact pressure on the 2-roller or 4-roller drive of the push-pull unit. Repeat the push-pull calibration. If the error message re-appears: Contact After-Sales Service.

St2 | E 16

Cause: Push-pull calibration was interrupted: Quick-stop was activated by pressing the torch trigger.

Remedy: Repeat push-pull calibration

Measuring welding circuit resistance r

General

Measuring the welding circuit resistance “r” makes it possible to have a constant welding result at all times, even with hosepacks of different lengths. The welding voltage at the arc is then always precisely regulated, regardless of the length and cross-sectional area of the hosepack. Adjustment using the arc length correction parameter is no longer necessary.

The calculated welding circuit resistance is displayed on the right-hand digital display.

r ... Welding circuit resistance (in mW)

If the welding circuit resistance r has been measured correctly, the welding voltage will correspond exactly to the welding voltage at the arc. If you manually measure the voltage on the output jacks of the power source, this voltage will be higher than the welding voltage at the arc - that is, higher by the same amount as the voltage drop of the hosepack.

NOTE!

The welding circuit resistance r depends on the hosepack used:

- ▶ if the hosepack length or cross-sectional area is changed, measure the welding circuit resistance r again
- ▶ measure the welding circuit resistance for each welding process separately with the appropriate welding leads

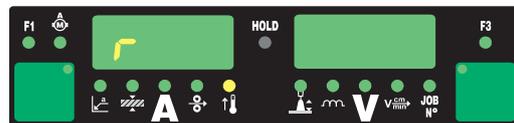
Measuring welding circuit resistance r

NOTE!

In order to obtain good welding results, it is essential to measure the welding circuit resistance correctly.

Make sure that the contact between the earthing clamp and the workpiece is on a cleaned workpiece surface.

- 1 Make a ground (earth) connection to the workpiece
- 2 Open the Setup menu - level 2 (2nd)
- 3 Select parameter “r”



- 4 Remove the gas nozzle from the welding torch
- 5 Screw on the contact tube

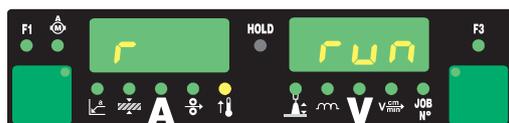
NOTE!

Make sure that the contact between the contact tube and the workpiece is on a cleaned workpiece surface.

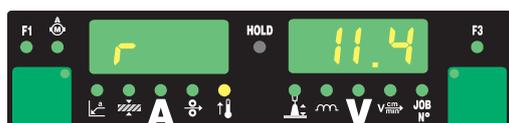
While the measurement is being performed, the wire-feed unit and the cooling unit are deactivated.

- 6 Place the contact tube down firmly on the surface of the workpiece

- 7 Briefly press the torch trigger or the Feeder inching button
The welding circuit resistance is calculated. During the measurement "run" is displayed on the right-hand digital display.



The measurement is finished when the welding circuit resistance is shown on the right-hand digital display (e.g. 11.4 mW)



- 8 Fit the gas nozzle back onto the welding torch

Displaying welding circuit inductivity L

General

The way that the interconnecting hosepack is arranged has a very significant effect on the weld properties. In MIG/MAG pulse synergic welding in particular, high welding circuit inductivity may occur, depending on the length of the interconnecting hosepack and the way it is arranged. The current rise during droplet transfer is limited.

NOTE!

Wherever possible, compensation for the welding circuit inductivity is performed automatically.

Where very high welding circuit inductivity occurs, it is also possible to attempt to influence the welding results with the droplet detachment correction parameter. If this does not produce the desired result, you must rearrange the interconnecting hosepack.

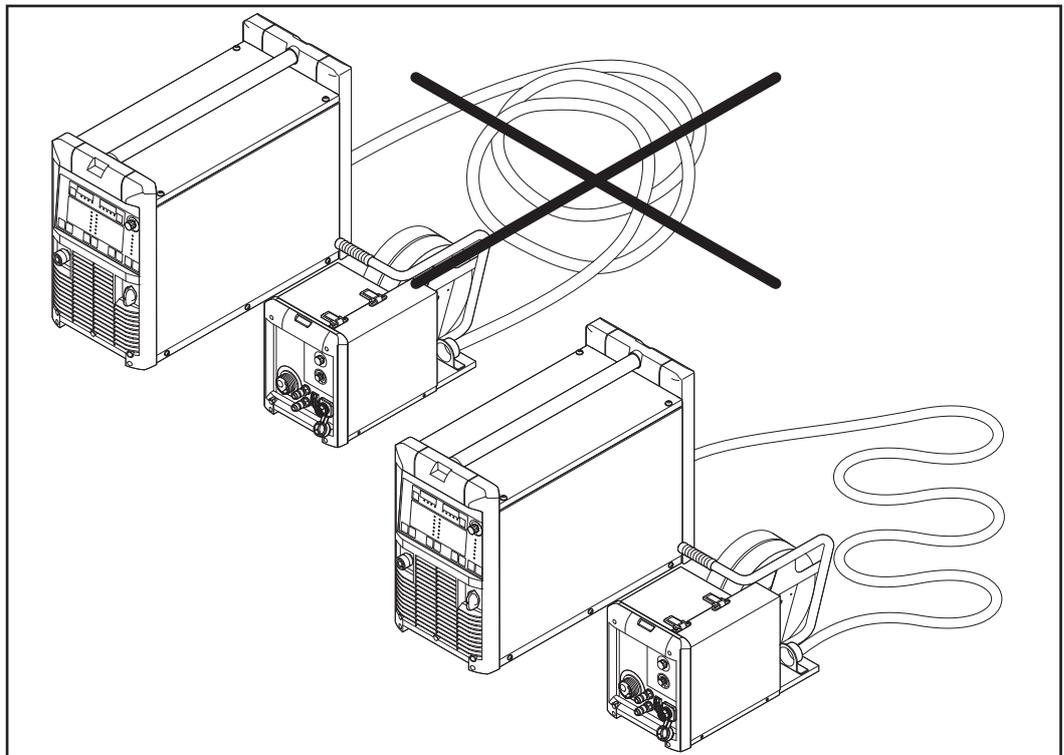
Displaying welding circuit inductivity L

- 1 Open the Setup menu level 2 (2nd)
- 2 Select parameter "L"

The welding circuit inductivity L calculated during the welding process is displayed on the right-hand digital display.

L ... Welding circuit inductivity (in microhenrys)

Arranging the interconnecting hosepack correctly



Arranging the interconnecting hosepack correctly

Troubleshooting and maintenance

Troubleshooting

General

The digital power sources are equipped with an intelligent safety system. This means that apart from the fuse for the coolant pump, it has been possible to dispense with melt-ing-type fuses entirely. After a possible malfunction or error has been remedied, the power source can be put back into normal operation again without any fuses having to be replaced.

Safety



WARNING!

An electric shock can be fatal.

Before opening the device

- ▶ Turn the mains switch to the "O" position
- ▶ Unplug the device from the mains
- ▶ Ensure the device cannot be switched back on
- ▶ Using a suitable measuring instrument, check to make sure that electrically charged components (e.g. capacitors) have been discharged



WARNING!

An inadequate ground conductor connection can cause serious injury or damage.

The housing screws provide a suitable ground conductor connection for earthing the housing.

- ▶ The housing screws must NOT be replaced by any other screws that do not provide a reliable ground conductor connection.

Displayed service codes

If any error message that is not described here appears on the displays, then the fault can only be fixed by a service technician. Make a note of the error message shown in the display and of the serial number and configuration of the power source, and contact our After-Sales Service team with a detailed description of the error.

-St | oP-

Where the power source is being operated with a robot interface or a field bus

Cause: Robot not ready

Remedy: Initialise "Robot ready" signal, initialise "Source error reset" signal ("Source error reset" only available in conjunction with ROB 5000 and field bus coupler for robot control)

dsP | A21

Can only occur when power sources are being operated in parallel or in Twin mode

Cause: The power source is configured for either parallel operation (setup parameter P-C is set to "ON") or for TimeTwin Digital (setup parameter T-C is set to "ON"). However, the LHSB link has been disconnected or has become faulty while the power source was switched on.

Remedy: Reset the service code: Switch the power source off and back on again. If necessary, restore or repair the LHSB link.

dSP | Axx

Cause: Fault in the central control and regulation unit

Remedy: Contact After-Sales Service

dSP | Cxx

Cause: Fault in the central control and regulation unit

Remedy: Contact After-Sales Service

dSP | Exx

Cause: Fault in the central control and regulation unit

Remedy: Contact After-Sales Service

dSP | Sy

Cause: Fault in the central control and regulation unit

Remedy: Contact After-Sales Service

dSP | nSy

Cause: Fault in the central control and regulation unit

Remedy: Contact After-Sales Service

E-S | toP

only with the External stop and External stop - inching enabled options

Cause: The External stop or External stop - inching enabled option has tripped

Remedy: Acknowledge the service code via the robot control unit and re-apply the 24 V SELV safety voltage

EFd | xx.x

Cause: Fault in the wire feed system (overcurrent in wire-feed unit drive)

Remedy: Arrange the hosepack in as straight a line as possible; check that there are no kinks or dirt in the inner liner; check the contact pressure on the 2-roller (or 4-roller) drive

Cause: Wire-feed unit motor is sticking or defective

Remedy: Check or replace the wire-feed unit motor

EFd | 8.1

Cause: Fault in the wire feed system (overcurrent in wire-feed unit drive)

Remedy: Arrange the hosepack in as straight a line as possible; check that there are no kinks or dirt in the inner liner; check the contact pressure on the 2-roller (or 4-roller) drive

Cause: Wire-feed unit motor is sticking or defective

Remedy: Check or replace the wire-feed unit motor

EFd | 8.2

Cause: Fault in the wire feed system (overcurrent in wire-feed unit drive)

Remedy: Arrange the hosepack in as straight a line as possible; check that there are no kinks or dirt in the inner liner; check the contact pressure on the 2-roller (or 4-roller) drive

EFd | 9.1

Cause: The external supply voltage has dropped below the tolerance range

Remedy: Check the external supply voltage

Cause: Wire-feed unit motor is sticking or defective

Remedy: Check or replace the wire-feed unit motor

EFd | 9.2

Cause: The external supply voltage has exceeded the upper limit of the tolerance range

Remedy: Check the external supply voltage

EFd | 12.1

Cause: No actual rotational speed value from the wire-feed unit motor

Remedy: Check the actual-value pick-up and the cable connections to and from it, and replace if necessary

EFd | 12.2

Cause: No actual value rotational speed from the push-pull unit motor

Remedy: Check the actual-value pick-up and the cable connections to and from it, and replace if necessary

EFd | 15.1

Wire buffer empty

Cause: Counter lever on main wire-feed unit open

Remedy: Close counter lever on main wire-feed unit
Acknowledge service code using Feeder inching button

Cause: Main wire-feed unit slipping

Remedy: Check wearing parts on wire-feed unit
Use suitable feed rollers
Decrease wire braking force
Increase contact pressure on main wire-feed unit
Acknowledge service code using Feeder inching button

Cause: End of wire reached

Remedy: Check whether sufficient wire is available
Acknowledge service code using Feeder inching button

EFd | 15.2

Wire buffer full

Cause: Counter lever on push-pull unit open

Remedy: Close counter lever on push-pull unit
Acknowledge service code using Feeder inching button

Cause: Push-pull unit slipping

Remedy: Check wearing parts for wire feeding
Use suitable feed rollers
Increase contact pressure on the push-pull unit
Acknowledge service code using the Feeder inching button"

Cause: Arc not igniting due to inadequate ground (earth) connection

Remedy: Check the ground (earth) connection
Acknowledge service code using the Feeder inching button

Cause: Arc not igniting due to the wrong welding program setting

Remedy: Select wire diameter and material type in accordance with the material used (select a suitable welding program). Acknowledge service code using the Feeder inching button

EFd | 15.3

No wire buffer available

Cause: Connection to wire buffer missing

Remedy: Check connection to wire buffer, check wire buffer control line

EFd | 30.1

Cause: LHSB connection to power source missing

Remedy: Check LHSB connection to power source

EFd | 30.3

Cause: LHSB connection to CMT drive unit missing

Remedy: Check LHSB connection to CMT drive unit

EFd | 31.1

Cause: Rotor calibration on the CMT drive unit failed

Remedy: Switch power source off and on again; if the service code "EFd | 31.1" remains, switch off power source, disengage CMT drive unit and switch power source back on again; if still unsuccessful, contact After-Sales Service

EFd | 31.2

Cause: Rotor calibration on the CMT drive unit is running

Remedy: Wait for rotor calibration to finish

EiF XX.Y

Values XX and Y are taken from the operating instructions for the robot interface.

Cause: Interface error

Remedy: See the operating instructions for the robot interface

Err | 049

Cause: Phase failure

Remedy: Check the mains fuse, the mains lead and the mains plug

Err | 050

Cause: Intermediate circuit-balance error

Remedy: Contact After-Sales Service

Err | 051

Cause: Mains undervoltage: The mains voltage has fallen below the tolerance range

Remedy: Check the mains voltage

Err | 052

Cause: Mains overvoltage: The mains voltage has risen above the tolerance range

Remedy: Check the mains voltage

Err | 054

Cause: "Sticking" of the wire in the solidifying weld pool

Remedy: Cut off the sticking wire end;
there is no need to acknowledge this error message

Err | 056

Cause: The "Wire-end check" option has detected the end of the wire electrode

Remedy: Insert a new wirepool and feed the wire electrode into the hosepack;
acknowledge Err | 056 by pressing the Store button

Cause: Additional fan filter of the VR 1500 - 11 / 12 / 30 is contaminated
air supply for the additional fan is no longer sufficient to cool the power electronics
the power electronics temperature switch has tripped

Remedy: Clean filter or replace;
acknowledge Err | 056 by pressing the Store button

Cause: Excessive ambient temperature on the VR 1500 - 11 / 12 / 30

Remedy: Reduce ambient temperature
if necessary position and operate welding machine at a cooler location;
acknowledge Err | 056 by pressing the Store button

Cause: Excessive motor current on the VR 1500 - 11 / 12 / 30, e.g. due to wire feed problems or an adequately dimensioned wire-feed unit

Remedy: Check wire feed conditions, rectify errors;
acknowledge Err | 056 by pressing the Store button

Cause: VR 1530 wire-feed unit cover open or interlock release handles not snapped into place

Remedy: Close VR 1530 wire-feed unit cover properly
acknowledge Err | 056 by pressing the Store button

Err | 062

"E62" is displayed on the TP 08 remote control at the same time

Cause: Overheating of TP 08 remote control

Remedy: Allow TP 08 remote control to cool down

Err | 069

Cause: Illegal mode change during welding (e.g. changing from a MIG/MAG job to a TIG job)

Remedy: Re-start welding action

Err |70.X

Cause: Fault in digital gas sensor
Err 70.1 ... Gas sensor not found
Err 70.2 ... No gas
Err 70.3 ... Calibration error
Err 70.4 ... Solenoid valve faulty
Err 70.5 ... Solenoid valve not found

Remedy: Check gas supply

Err |71.X

Set limits have been exceeded or have not been reached.

Cause: Err 71.1 ... Current limit exceeded
Err 71.2 ... Current limit not reached
Err 71.3 ... Voltage limit exceeded
Err 71.4 ... Voltage limit not reached

Remedy: Check quality of weld seam

Err |77.X

The current limit set for a wire-feed unit motor has been exceeded

Cause: Err 77.7 ... Wire-feed unit motor current exceeded
Err 77.8 ... PPU motor current exceeded

Remedy: Check the wire-feed unit components (e.g. feed rollers, inner liner, inlet/outlet nozzles, etc.); check quality of weld seam

Err | bPS

Cause: Fault in power module

Remedy: Contact After-Sales Service

Err | Cfg

Can only occur when power sources are being operated in parallel or in Twin mode

Cause: Power source is configured for parallel operation (setup parameter P-C is set to "ON") or TimeTwin Digital (setup parameter T-C is set to "ON"). However, after being switched on, the power source was unable to establish an LHSB link (LHSB link was previously detached or faulty).

Remedy: Reset the service code: Switch the power source off and back on again. If necessary, restore or repair the LHSB connection.

Err | IP

Cause: Primary overcurrent

Remedy: Contact After-Sales Service

Err | PE

Cause: The earth current watchdog has triggered the safety cut-out of the power source.

Remedy: Switch off the power source, wait for 10 seconds and then switch it on again. If you have tried this several times and the error keeps recurring, contact After-Sales Service.

Err | tJo

Cause: JobMaster torch temperature sensor faulty

Remedy: Contact After-Sales Service

hot | H2O

Cause: Thermostat on cooling unit has tripped

Remedy: Wait until the end of the cooling phase, i.e. until "Hot | H2O" is no longer displayed.
ROB 5000 or field bus coupler for robot control: Before resuming welding, initialise the "Source error reset" signal.

no | Arc

Cause: Arc break

Remedy: Shorten the wire stick-out; press the torch trigger repeatedly; clean the surface of the workpiece

no | GAS

Cause: The "Gas watchdog" option has detected that there is no gas pressure

Remedy: Connect a new gas cylinder and open the gas cylinder valve/pressure regulator;
Acknowledge no | GAS by pressing the Store button

no | IGn

Cause: Ignition time-out function is active: No current started flowing before the length of wire specified in the Setup menu had been fed. The safety cut-out of the power source has been triggered.

Remedy: Shorten the wire stick-out; press the torch trigger repeatedly; clean the surface of the workpiece; if necessary, increase the setting in "Setup menu: Level 2" for the length of wire that is fed before the safety cut-out is triggered.

no | H2O

Cause: Cooling unit flow watchdog has been triggered

Remedy: Check the cooling unit; top up with coolant or bleed the water flow if necessary (see cooling unit operating instructions). Then acknowledge the error by pressing the Store button

no | Prg

Cause: No preconfigured program has been selected

Remedy: Select a configured program

r | E30

Cause: r-calibration: There is no contact with the workpiece.

Remedy: Connect the grounding (earthing) cable; ensure a tight connection between the contact pipe and the workpiece

r | E31

Cause: r-calibration: Procedure has been interrupted by repeated pressing of the torch trigger.

Remedy: Ensure a tight connection between the contact tube and the workpiece
press the torch trigger once only

r | E32

Cause: r-calibration: Grounding (earthing) cable, current cable or hosepack defective (value is below 0.5 mOhm or exceeds 30 mOhm)

Remedy: Check grounding (earthing) cable, current cable or hosepack and replace if necessary

r | E33

Cause: r-calibration: Poor contact between the contact tube and the workpiece.

Remedy: Clean the point of contact, tighten the contact tube, check the grounding (earthing) connection

r | E34

Cause: r-calibration: Poor contact between the contact tube and the workpiece.

Remedy: Clean the point of contact, tighten the contact tube, check the grounding (earthing) connection

tJO | xxx

At the same time, "E66" is displayed on the JobMaster

Note: xxx is a temperature value

Cause: Overheating in JobMaster welding torch

Remedy: Allow the torch to cool, then acknowledge the error by pressing the Store button

tP1 | xxx

Note: xxx is a temperature value

Cause: Overtemperature in the primary circuit of the power source

Remedy: Allow power source to cool down

tP2 | xxx

Note: xxx is a temperature value

Cause: Overtemperature in the primary circuit of the power source

Remedy: Allow power source to cool down

tP3 | xxx

Note: xxx is a temperature value

Cause: Overtemperature in the primary circuit of the power source

Remedy: Allow power source to cool down

tP4 | xxx

Note: xxx is a temperature value

Cause: Overtemperature in the primary circuit of the power source

Remedy: Allow power source to cool down

tP5 | xxx

Note: xxx is a temperature value

Cause: Overtemperature in the primary circuit of the power source

Remedy: Allow power source to cool down

tP6 | xxx

Note: xxx is a temperature value

Cause: Overtemperature in the primary circuit of the power source

Remedy: Allow power source to cool down

tS1 | xxx

Note: xxx is a temperature value

Cause: Overtemperature in the secondary circuit of the power source

Remedy: Allow power source to cool down

tS2 | xxx

Note: xxx is a temperature value

Cause: Overtemperature in the secondary circuit of the power source

Remedy: Allow power source to cool down

tS3 | xxx

Note: xxx is a temperature value

Cause: Overtemperature in the secondary circuit of the power source

Remedy: Allow power source to cool down

**Power source -
troubleshooting**

tSt | xxx

Note: xxx is a temperature value

Cause: Overtemperature in the control circuit

Remedy: Allow power source to cool down

Power source does not function

Mains switch is on, but indicators are not lit up

Cause: There is a break in the mains lead; the mains plug is not plugged in

Remedy: Check the mains lead, ensure that the mains plug is plugged in

Cause: Mains socket or mains plug faulty

Remedy: Replace faulty parts

Cause: Mains fuse protection

Remedy: Change the mains fuse protection

Cause: Short circuit on the 24 V supply of SpeedNet connection socket or external sensor

Remedy: Unplug connected components

No welding current

Mains switch is on, one of the overtemperature service codes "to" is displayed. Detailed information on the service codes "to0" to "to6" can be found in the section "Displayed service codes".

Cause: Overload

Remedy: Take the duty cycle into account

Cause: Thermostatic safety cut-out has tripped

Remedy: Wait until the power source automatically comes back on after the end of the cooling phase

Cause: Limited supply of cooling air

Remedy: Remove air filter on the rear of the housing from the side and clean. Ensure that the cooling air ducts are accessible.

Cause: The fan in the power source is faulty

Remedy: Contact After-Sales Service

No welding current

Mains switch is ON and indicators are lit up

Cause: Grounding (earthing) connection is incorrect

Remedy: Check the grounding (earthing) connection for correct polarity

Cause: There is a break in the power cable in the welding torch

Remedy: Replace the welding torch

Nothing happens when the torch trigger is pressed

Mains switch is on and indicators are lit up

Cause: The control plug is not plugged in

Remedy: Plug in the control plug

Cause: Welding torch or welding torch control line is faulty

Remedy: Change the welding torch

Cause: The interconnecting hosepack is defective or not connected properly (not for TPS 2700)

Remedy: Check interconnecting hosepack

No protective gas shield

All other functions are OK

Cause: The gas cylinder is empty

Remedy: Change the gas cylinder

Cause: The gas pressure regulator is faulty

Remedy: Replace the gas pressure regulator

Cause: The gas hose is not connected, damaged or kinked

Remedy: Connect/replace the gas hose, or straighten out kinks

Cause: The welding torch is faulty

Remedy: Replace welding torch

Cause: Gas solenoid valve is faulty

Remedy: Replace gas solenoid valve

Poor weld properties

Cause: Incorrect welding parameters

Remedy: Check the settings

Cause: Poor ground earth connection

Remedy: Ensure good contact to workpiece

Cause: Inadequate or no protective gas shield

Remedy: Check the pressure regulator, gas hose, gas solenoid valve, torch gas connection, etc.

Cause: Welding torch is leaking

Remedy: Change the welding torch

Cause: Wrong contact tip, or contact tip is worn out

Remedy: Replace the contact tip

Cause: Wrong wire alloy or wrong wire diameter

Remedy: Check the wire electrode that has been inserted

Cause: Wrong wire alloy or wrong wire diameter

Remedy: Check weldability of the base material

Cause: The shielding gas is not suitable for this wire alloy

Remedy: Use the correct shielding gas

Irregular wire feed speed

Cause: Braking force has been set too high

Remedy: Loosen the brake

Cause: Hole in the contact tip is too narrow

Remedy: Use a suitable contact tip

Cause: Faulty inner liner in welding torch

Remedy: Check the inner liner for kinks, dirt, etc. and replace if necessary

Cause: The feed rollers are not suitable for the wire electrode being used

Remedy: Use suitable feed rollers

Cause: Feed rollers have the wrong contact pressure

Remedy: Optimise the contact pressure

Wirefeed problems

when using long hosepacks

Cause: Incorrect arrangement of hosepack

Remedy: Arrange the hosepack in as straight a line as possible, avoid tight bends

Welding torch becomes very hot

Cause: The specification of the welding torch is inadequate

Remedy: Observe the duty cycle and loading limits

Cause: Only on water-cooled systems: Inadequate coolant flow

Remedy: Check coolant level, coolant flow, for coolant contamination, etc. For further information refer to the cooling unit operating instructions.

Care, maintenance and disposal

General Under normal operating conditions, the power source requires only a minimum of care and maintenance. However, it is vital to observe some important points to ensure the welding system remains in a usable condition for many years.

Safety

WARNING!

An electric shock can be fatal.

Before opening the device

- ▶ Turn the mains switch to the "O" position
- ▶ Unplug the device from the mains
- ▶ Ensure the device cannot be switched back on
- ▶ Using a suitable measuring instrument, check to make sure that electrically charged components (e.g. capacitors) have been discharged

- At every start-up**
- Check mains plug, mains cable, welding torch, interconnecting hosepack and grounding (earthing) connection for damage
 - Check whether the all-round clearance of 0.5 m (1 ft. 8 in.) is kept to ensure that the cooling air can easily flow and escape.

NOTE!

Air inlets and outlets must never be covered, not even partially.

- Every 2 months**
- If present: clean air filter

Every 6 months

CAUTION!

Danger of damage to electronic components.

- ▶ Do not bring the air nozzle too close to electronic components.
-
- Open the device
 - Clean out the device interior using dry compressed air at reduced pressure
 - If a lot of dust has accumulated, clean the cooling air ducts

Disposal

Dispose of in accordance with the applicable national and local regulations.

Appendix

Average consumption values during welding

Average wire electrode consumption during MIG/MAG welding

Average wire electrode consumption at a wire speed of 5 m/min			
	1.0 mm wire electrode diameter	1.2 mm wire electrode diameter	1.6 mm wire electrode diameter
Steel wire electrode	1.8 kg/h	2.7 kg/h	4.7 kg/h
Aluminium wire electrode	0.6 kg/h	0.9 kg/h	1.6 kg/h
CrNi wire electrode	1.9 kg/h	2.8 kg/h	4.8 kg/h

Average wire electrode consumption at a wire speed of 10 m/min			
	1.0 mm wire electrode diameter	1.2 mm wire electrode diameter	1.6 mm wire electrode diameter
Steel wire electrode	3.7 kg/h	5.3 kg/h	9.5 kg/h
Aluminium wire electrode	1.3 kg/h	1.8 kg/h	3.2 kg/h
CrNi wire electrode	3.8 kg/h	5.4 kg/h	9.6 kg/h

Average shielding gas consumption during MIG/MAG welding

Wire electrode diameter	1.0 mm	1.2 mm	1.6 mm	2.0 mm	2 x 1.2 mm (TWIN)
Average consumption	10 l/min	12 l/min	16 l/min	20 l/min	24 l/min

Average shielding gas consumption during TIG welding

Gas nozzle size	4	5	6	7	8	10
Average consumption	6 l/min	8 l/min	10 l/min	12 l/min	12 l/min	15 l/min

Technical data

Special voltages For devices designed for special voltages, the technical data on the rating plate applies.

For all machines with a permitted mains voltage of up to 460 V: The standard mains plug allows the user to operate with a mains voltage of up to 400 V. For mains voltages up to 460 V fit a mains plug permitted for such use or install the mains supply directly.

TPS 2700

Mains voltage	3 x 400 V	
Mains voltage tolerance	+/- 15 %	
Mains frequency	50 / 60 Hz	
Mains fuse protection	16 A slow-blow	
Mains connection ¹⁾	Z _{max} at PCC ²⁾ = 95 mOhm	
Primary continuous current	100% d.c. ³⁾	6.6 A
Primary continuous power	4.5 - 8.7 kVA	
Cos phi	0.99	
Welding current range		
	MIG/MAG	3 - 270 A
	Rod electrode	10 - 270 A
	TIG	3 - 270 A
Welding current at		
	10 min / 40 °C (104 °F)	40 % d.c. ³⁾ 270 A
		60 % d.c. ³⁾ 270 A
		100% d.c. ³⁾ 170 A
Welding voltage range according to standard characteristic		
	MIG/MAG	14.2 - 27.5 V
	Rod electrode	20.4 - 30.8 V
	TIG	10.1 - 20.8 V
Max. welding voltage	34.6 V	
Open circuit voltage	50 V	
Degree of protection	IP 23	
Type of cooling	AF	
Insulation class	B	
EMC emission class	A	
Marks of conformity	CE, CSA	
Safety symbol	S	
Dimensions l x w x h	641.5 x 297.4 x 476.5 mm 25.26 x 11.71 x 18.76 in.	
Weight	27 kg 59.5 lb.	

Supply voltage in wire-feed unit	55 V DC
Nominal current in wire-feed unit	4 A
Wire feed speed	0.5 - 22 m/min 19.69 - 866.14 ipm
Wirespool types	all standardised wirespools
Max. permitted wirespool weight	16 kg 35.27 lb
Wirespool diameter	300 mm 11.81 in.
Wire diameter	0.8 - 1.6 mm 0.03 - 0.06 in.
Drive	4 roller drive
Maximum shielding gas pressure	7 bar 101 psi.
Power source efficiency at 400 V	50 W
Idle state power consumption at 270 A / 30.8 V	88 %

The wire-feed unit for the TPS 2700 is integrated in the power source.

1) connected to public grid at 230/400 V and 50 Hz

2) PCC = Interface to the public grid

3) d.c. = Duty cycle

TPS 2700 MV

Mains voltage	3 x 200-240 V 3 x 380-460 V	
Mains voltage tolerance	+/- 10 %	
Mains frequency	50 / 60 Hz	
Mains fuse protection	25/16 A slow-blow	
Mains connection ¹⁾	Z_{\max} at PCC ²⁾ = 95 mOhm	
Primary continuous current	100% d.c. ³⁾	6.4 - 14.2 A
Primary continuous power	4.6 - 10.7 kVA	
Cos phi	0.99	
Welding current range		
	MIG/MAG	3 - 270 A
	Rod electrode	10 - 270 A
	TIG	3 - 270 A
Welding current at		
	10 min / 40 °C (104 °F)	40 % d.c. ³⁾ 270 A
		60 % d.c. ³⁾ 270 A
		100% d.c. ³⁾ 170 A
Welding voltage range according to standard characteristic		
	MIG/MAG	14.2 - 27.5 V

	Rod electrode	20.4 - 30.8 V
	TIG	10.1 - 20.8 V
Max. welding voltage		34.6 V
Open circuit voltage		50 V
Degree of protection		IP 23
Type of cooling		AF
Insulation class		B
EMC emission class		A
Marks of conformity		CE, CSA
Safety symbol		S
Dimensions l x w x h	641.5 x 297.4 x 476.5 mm 25.26 x 11.71 x 18.76 in.	
Weight	27 kg 59.5 lb.	
Supply voltage in wire-feed unit		55 V DC
Nominal current in wire-feed unit		4 A
Wire feed speed	0.5 - 22 m/min 19.69 - 866.14 ipm	
Wirespool types	all standardised wirespools	
Max. permitted wirespool weight	16 kg 35.27 lb	
Wirespool diameter	300 mm 11.81 in.	
Wire diameter	0.8 - 1.6 mm 0.03 - 0.06 in.	
Drive	4 roller drive	
Maximum shielding gas pressure	7 bar 101 psi.	
Power source efficiency at 400 V	50 W	
Idle state power consumption at 270 A / 30.8 V	88 %	

The wire-feed unit for the TPS 2700 is integrated in the power source.

1) connected to public grid at 230/400 V and 50 Hz

2) PCC = Interface to the public grid

3) d.c. = Duty cycle

TPS 3200

Mains voltage	3 x 400 V	
Mains voltage tolerance	+/- 15 %	
Mains frequency	50 / 60 Hz	
Mains fuse protection	35 A slow-blow	
Mains connection ¹⁾	Restrictions possible	
Primary continuous current	100% d.c. ²⁾	12.6 - 16.7 A

Primary continuous power	8.7 - 11.5 kVA	
Cos phi	0.99	
Welding current range	MIG/MAG	3 - 320 A
	Rod electrode	10 - 320 A
	TIG	3 - 320 A
Welding current at	10 min/40 °C (104 °F)	40 % d.c. ²⁾ 320 A
		60 % d.c. ²⁾ 260 A
		100% d.c. ²⁾ 220 A
Welding voltage range according to standard characteristic	MIG/MAG	14.2 - 30.0 V
	Rod electrode	20.4 - 32.8 V
	TIG	10.1 - 22.8 V
Max. welding voltage (320 A)	52.1 V	
Open circuit voltage	65 V	
Degree of protection	IP 23	
Type of cooling	AF	
Insulation class	F	
EMC emission class	A	
Marks of conformity	CE	
Safety symbol	S	
Dimensions l x w x h	626 x 287 x 477 mm 24.65 x 11.30 x 18.78 in.	
Weight	34.6 kg 76.3 lb.	
Power source efficiency at 400 V	33.5 W	
Idle state power consumption at 320 A / 32.8 V	89 %	

¹⁾ connected to public grid at 230/400 V and 50 Hz

²⁾ d.c. = Duty cycle

TPS 3200 MV

Mains voltage	3 x 200-240 V 3 x 380-460 V	
Mains voltage tolerance	+/- 10 %	
Mains frequency	50 / 60 Hz	
Mains fuse protection	35 A slow-blow	
Mains connection ¹⁾	Restrictions possible	
Primary continuous current	100% d.c. ²⁾	10.6 - 31.2 A
Primary continuous power	8.7 - 11.5 kVA	
Cos phi	0.99	

Welding current range			
	MIG/MAG		3 - 320 A
	Rod electrode		10 - 320 A
	TIG		3 - 320 A
Welding current at			
	10 min/40 °C (104 °F)	40 % d.c. ²⁾	320 A
		60 % d.c. ²⁾	260 A
		100% d.c. ²⁾	220 A
Welding voltage range according to standard characteristic			
	MIG/MAG		14.2 - 30.0 V
	Rod electrode		20.4 - 32.8 V
	TIG		10.1 - 22.8 V
Max. welding voltage (320 A)			49.1 - 63.1 V
Open circuit voltage			64 - 67 V
Degree of protection			IP 23
Type of cooling			AF
Insulation class			F
EMC emission class			A
Marks of conformity			CE, CSA
Safety symbol			S
Dimensions l x w x h			626 x 287 x 477 mm 24.65 x 11.30 x 18.78 in.
Weight			34.6 kg 76.3 lb.
Power source efficiency at 400 V			33.5 W
Idle state power consumption at 320 A / 32.8 V			89 %

¹⁾ connected to public grid at 230/400 V and 50 Hz

²⁾ d.c. = Duty cycle

**TPS 3200
460 V AC**

Mains voltage		3 x 380-460 V
Mains voltage tolerance		+/- 10 %
Mains frequency		50 / 60 Hz
Mains fuse protection		according to rating plate
Mains connection ¹⁾		Restrictions possible
Primary continuous current		
	40 % d.c. ²⁾	13.4 A
	60 % d.c. ²⁾	12.7 A
	100% d.c. ²⁾	13.0 A
Max. primary current		

	40 % d.c. ²⁾	21.3 A	
	60 % d.c. ²⁾	16.4 A	
	100% d.c. ²⁾	13.0 A	
Primary continuous power			
	40 % d.c. ²⁾	17.0 kVA	
	60 % d.c. ²⁾	13.1 kVA	
	100% d.c. ²⁾	10.4 kVA	
Cos phi			
0.99			
Welding current range			
	MIG/MAG	3 - 320 A	
	Rod electrode	10 - 320 A	
	TIG	3 - 320 A	
Welding current at			
	10 min/40 °C (104 °F)	40 % d.c. ²⁾	320 A
		60 % d.c. ²⁾	260 A
		100% d.c. ²⁾	220 A
Welding voltage range according to standard characteristic			
	MIG/MAG	14.2 - 30.0 V	
	Rod electrode	20.4 - 32.8 V	
	TIG	10.1 - 22.8 V	
Max. welding voltage (320 A)			
49.1 - 63.1 V			
Open circuit voltage			
64 - 67 V			
Degree of protection			
IP 23			
Type of cooling			
AF			
Insulation class			
F			
EMC emission class			
A			
Marks of conformity			
CE, CSA			
Safety symbol			
S			
Dimensions l x w x h			
626 x 287 x 477 mm			
24.65 x 11.30 x 18.78 in.			
Weight			
34.6 kg			
76.3 lb.			
Power source efficiency at 400 V			
33.5 W			
Idle state power consumption at 320 A / 32.8 V			
89 %			

¹⁾ connected to public grid at 230/400 V and 50 Hz

²⁾ d.c. = Duty cycle

TS/TPS 4000

Mains voltage	3 x 400 V
Mains voltage tolerance	+/- 15 %

Mains frequency			50 / 60 Hz
Mains fuse protection			35 A slow-blow
Mains connection ¹⁾			Restrictions possible
Primary continuous current	100% d.c. ²⁾	26 A	
Primary continuous power			12.2 kVA
Cos phi			0.99
Welding current range			
	MIG/MAG	3 - 400 A	
	Rod electrode	10 - 400 A	
	TIG	3 - 400 A	
Welding current at			
	10 min/40 °C (104 °F)	50 % d.c. ²⁾	400 A
		60 % d.c. ²⁾	365 A
		100% d.c. ²⁾	320 A
Welding voltage range according to standard characteristic			
	MIG/MAG	14.2 - 34.0 V	
	Rod electrode	20.4 - 36.0 V	
	TIG	10.1 - 26.0 V	
Max. welding voltage			48 V
Open circuit voltage			70 V
Degree of protection			IP 23
Type of cooling			AF
Insulation class			F
EMC emission class			A
Marks of conformity			CE, CSA
Safety symbol			S
Dimensions l x w x h			626 x 287 x 477 mm 24.65 x 11.30 x 18.78 in.
Weight			35.2 kg 77.6 lb.
Power source efficiency at 400 V			31.6 W
Idle state power consumption at 400 A / 36 V			89 %

¹⁾ connected to public grid at 230/400 V and 50 Hz

²⁾ d.c. = Duty cycle

TS/TPS 4000 MV

Mains voltage	3 x 200-240 V 3 x 380-460 V	
Mains voltage tolerance	+/- 10 %	
Mains frequency	50 / 60 Hz	
Mains fuse protection	63/35 A slow-blow	

Mains connection ¹⁾		Restrictions possible
Primary continuous current	100% d.c. ²⁾	15.3 - 34.4 A
Primary continuous power		10.6 - 12.4 kVA
Cos phi		0.99
Welding current range		
	MIG/MAG	3 - 400 A
	Rod electrode	10 - 400 A
	TIG	3 - 400 A
Welding current at		
	10 min/40 °C (104 °F)	50 % d.c. ²⁾ 400 A
		60 % d.c. ²⁾ 365 A
		100% d.c. ²⁾ 280 - 320 A
Welding voltage range according to standard characteristic		
	MIG/MAG	14.2 - 34.0 V
	Rod electrode	20.4 - 36.0 V
	TIG	10.1 - 26.0 V
Max. welding voltage		48 V
Open circuit voltage		68 - 78 V
Degree of protection		IP 23
Type of cooling		AF
Insulation class		F
EMC emission class		A
Marks of conformity		CE, CSA
Safety symbol		S
Dimensions l x w x h		626 x 287 x 477 mm 24.65 x 11.30 x 18.78 in.
Weight		35.2 kg 77.6 lb.
Power source efficiency at 400 V		44.3 W
Idle state power consumption at 400 A / 36 V		90 %

¹⁾ connected to public grid at 230/400 V and 50 Hz

²⁾ d.c. = Duty cycle

TS/TPS 5000

Mains voltage		3 x 400 V
Mains voltage tolerance		+/- 15 %
Mains frequency		50 / 60 Hz
Mains fuse protection		35 A slow-blow
Mains connection ¹⁾		Restrictions possible
Primary continuous current	100% d.c. ²⁾	18 - 29.5 A

Primary continuous power			13.1 kVA
Cos phi			0.99
Welding current range			
	MIG/MAG	3 - 500 A	
	Rod electrode	10 - 500 A	
	TIG	3 - 500 A	
Welding current at			
	10 min/40 °C (104 °F)	40 % d.c. ²⁾	500 A
		60 % d.c. ²⁾	450 A
		100% d.c. ²⁾	360 A
Welding voltage range according to standard characteristic			
	MIG/MAG	14.2 - 39.0 V	
	Rod electrode	20.4 - 40.0 V	
	TIG	10.1 - 30.0 V	
Max. welding voltage			49.2 V
Open circuit voltage			70 V
Degree of protection			IP 23
Type of cooling			AF
Insulation class			F
EMC emission class			A
Marks of conformity			CE, CSA
Safety symbol			S
Dimensions l x w x h			626 x 287 x 477 mm 24.65 x 11.30 x 18.78 in.
Weight			35.6 kg 78.5 lb.
Power source efficiency at 400 V			31.8 W
Idle state power consumption at 500 A / 40 V			90 %

1) connected to public grid at 230/400 V and 50 Hz

2) d.c. = Duty cycle

TS/TPS 5000 MV

Mains voltage			3 x 200-240 V 3 x 380-460 V
Mains voltage tolerance			+/- 10 %
Mains frequency			50 / 60 Hz
Mains fuse protection			63/35 A slow-blow
Mains connection ¹⁾			Restrictions possible
Primary continuous current	100% d.c. ²⁾	10.1 - 36.1 A	
Primary continuous power			12.4 - 13.9 kVA
Cos phi			0.99

Welding current range			
	MIG/MAG		3 - 500 A
	Rod electrode		10 - 500 A
	TIG		3 - 500 A
Welding current at			
	10 min/40 °C (104 °F)	40 % d.c. ²⁾	500 A
		60 % d.c. ²⁾	450 A
		100% d.c. ²⁾	320 - 340 A
Welding voltage range according to standard characteristic			
	MIG/MAG		14.2 - 39.0 V
	Rod electrode		20.4 - 40.0 V
	TIG		10.1 - 30.0 V
Max. welding voltage			49.2 V
Open circuit voltage			68 - 78 V
Degree of protection			IP 23
Type of cooling			AF
Insulation class			F
EMC emission class			A
Marks of conformity			CE, CSA
Safety symbol			S
Dimensions l x w x h		626 x 287 x 477 mm 24.65 x 11.30 x 18.78 in.	
Weight		35.6 kg 78.5 lb.	
Power source efficiency at 400 V			40.4 W
Idle state power consumption at 500 A / 40 V			90 %

¹⁾ connected to public grid at 230/400 V and 50 Hz

²⁾ d.c. = Duty cycle

Technical data - US devices

See TPS 2700 MV / 3200 MV and TS / TPS 4000 MV / 5000 MV

Technical data - Alu edition, CrNi edition, Yard edi- tion and CMT variants

The technical data of the Alu edition, CrNi edition, Yard edition and CMT is identical to that of the standard power sources.

TIME 5000 Digital

Mains voltage	3 x 380 - 460 V
Mains voltage tolerance	+/- 10 %

Mains frequency	50 / 60 Hz	
Mains fuse protection	35 A slow-blow	
Mains connection ¹⁾	Z_{\max} at PCC ²⁾ = 50 mOhm	
Primary continuous current	450 A, 60% d.c. ³⁾	32.5 A
Primary continuous power	21.4 kVA	
Cos phi	0.99	
Efficiency	91 %	
Welding current range		
	TIME	3 - 500 A
	MIG/MAG	3 - 500 A
	Rod electrode	10 - 500 A
	TIG	3 - 500 A
Welding current at		
	10 min/40 °C (104 °F)	40 % d.c. ³⁾ 500 A
		60 % d.c. ³⁾ 450 A
		100% d.c. ³⁾ 360 A
Welding voltage range according to standard characteristic		
	TIME	28.0 - 48.0 V
	MIG/MAG	14.2 - 39.0 V
	Rod electrode	20.4 - 40.0 V
	TIG	10.1 - 30.0 V
Max. welding voltage	48 V	
Open circuit voltage	70 V	
Degree of protection	IP 23	
Type of cooling	AF	
Insulation class	F	
EMC emission class	A	
Marks of conformity	CE	
Safety symbol	S	
Dimensions l x w x h	626 x 287 x 477 mm 24.65 x 11.30 x 18.78 in.	
Weight	37.4 kg 82.45 lb.	

¹⁾ connected to public grid at 230/400 V and 50 Hz

²⁾ PCC = Interface to the public grid

³⁾ d.c. = Duty cycle

CMT 4000 Advanced

Mains voltage	3 x 400 V
Mains voltage tolerance	+/- 15 %

Mains frequency	50 / 60 Hz	
Mains fuse protection	35 A slow-blow	
Mains connection ¹⁾	Restrictions possible	
Primary continuous current	100% d.c. ²⁾	-
Primary continuous power	15 kVA	
Cos phi	0.99	
Welding current range		
	MIG/MAG	3 - 400 A
	Rod electrode	10 - 400 A
Welding current at		
	10 min/40 °C (104 °F)	40 % d.c. ²⁾ 400 A
		60 % d.c. ²⁾ 360 A
		100% d.c. ²⁾ 300 A
Welding voltage range according to standard characteristic		
	MIG/MAG	14.2 - 34.0 V
	Rod electrode	20.4 - 36.0 V
Max. welding voltage	-	
Open circuit voltage	90 V	
Degree of protection	IP 23	
Type of cooling	AF	
Insulation class	F	
EMC emission class	A	
Marks of conformity	CE	
Safety symbol	S	
Dimensions l x w x h	625 x 290 x 705 mm 24.61 x 11.42 x 27.76 in.	
Weight	54.2 kg 119.49 lb.	
Power source efficiency at 400 V	42.9 W	
Idle state power consumption at 400 A / 36 V	86 %	

¹⁾ connected to public grid at 230/400 V and 50 Hz

²⁾ d.c. = Duty cycle

CMT 4000 Advanced MV

Mains voltage	3 x 200 - 240 V 3 x 380 - 460 V
Mains voltage tolerance	+/- 10%
Grid frequency	50/60 Hz
Mains fuse protection	63/35 A slow-blow
Mains connection ¹⁾	Restrictions possible

Primary continuous current	100% D.C. 2)	-
Primary continuous power		13.0 - 16.0 kVA
Cos phi		0.99
Welding current range		
	MIG/MAG	3 - 400 A
	Rod electrode	10 - 400 A
Welding current at		
	10 min/40 °C (104 °F)	40% D.C. 2)
		400 A
		60% D.C. 2)
		350 A
		100% D.C. 2)
		290 A
Welding voltage range according to standard characteristic		
	MIG/MAG	14.2 - 34.0 V
	Rod electrode	20.4 - 36.0 V
Max. welding voltage		-
Open circuit voltage		90 V
Degree of protection		IP 23
Type of cooling		AF
Insulation class		F
EMC device class		A
Marks of conformity		CE, CSA
Safety symbols		S
Dimensions L x W x H		625 x 290 x 705 mm 24.61 x 11.42 x 27.76 in.
Weight		56.0 kg 123.46 lb.
Power source efficiency at 400 V		47.9 W
Idle state power consumption at 400 A / 36 V		86 %

1) to public grids at 230 / 400 V and 50 Hz

2) D.C. = duty cycle

Overview with critical raw materials, year of production of the device

Overview with critical raw materials:

An overview of which critical raw materials are contained in this device can be found at the following Internet address.

www.fronius.com/en/about-fronius/sustainability.

To calculate the year of production of the device:

- Each device is provided with a serial number
- The serial number consists of 8 digits - for example 28020099
- The first two digits give the number from which the year of production of the device can be calculated
- This figure minus 11 gives the year of production
 - For example: Serial number = 28020065, calculation of the year of production = 28 - 11 = 17, year of production = 2017

Welding program databases

Explanation of symbols

The key symbols for the welding program databases are explained below. The databases contain the welding programs depending on the following settings on the control panel:

- Mode:
 - P = Pulse synergic welding
 - S = Standard synergic welding
 - CMT = Cold Metal Transfer
 - C-P = CMT/pulse characteristic
- Welding programs that support the SFi (spatter free ignition) option have a grey background.

Setting up a welding program database - example

Welding Programs		TS/TPS 3200/4000/5000 CMT							
(2)	M09-0005	12.9.2006	(3)	0.8	0.9	1.0	1.2	SP	(4)
	G3 Si1 / ER 70 (ArCO2)			P 0074 S 0008		P 0346 S 1084	P 0378 S 0375		
	CrNi 18 8 / ER307 (Ar 97.5%/CO2 2.5%)			P 0148 S 0149		P 0421 S 0102	P 0345 S 0033		
	CrNi 19 9 / ER308 (Ar 97.5%/CO2 2.5%)			P 0076 S 0009 C-P 0959		P 0414 S 0101 C-P 0882	P 0415 S 0011 C-P 0929		
	AlMg 5 / ER5356 (Ar 100%)			P 0137 S 0138		P 0408 S 0014 C-P 1070	P 0191 S 0015 C-P 0879		
	AlSi 5 / ER4043 (Ar 100%)			P 0141 S 0142		P 0131 S 0132 C-P 1076	P 0116 S 0016 C-P 0881		
	CuSi 3 / ER CuSi-A (Ar 100%)					P 0405 S 0104 C-P 0884	P 0342 S 0153		
	CuAl 9 / ER CuAl-A (Ar 100%)			P 0071 S 0018		P 0143 S 0103 C-P 0883	P 0113 S 0020		
	SP1								
(1)	G3 Si1 / ER 70-S-3/6 (CO2 100%)			S 0736	S 0519	S 0737 CMT 1055	S 0687 CMT 0986		
	G3 Si1 / ER 70-S-3/6 (Ar 82%/CO2 18%)			P 0735 S 0602	S 0808	P 0891 S 0603 CMT 1053	P 0271 S 0783 CMT 0963		
	CrNi 18 8 / ER307 (Ar 97.5%/CO2 2.5%)								
	CrNi 19 9 / ER308 (Ar 97.5%/CO2 2.5%)			P 0766 S 0765 CMT 0960	P 0525 S 0524	P 0799 S 0767 CMT 0877	P 0539 S 0538 CMT 0928		
	AlMg 5 / ER5356 (Ar 100%)					CMT 1069	CMT 0875		
	AlSi 5 / ER4043 (Ar 100%)					CMT 1075	CMT 0876		
	CuSi 3 / ER CuSi-A (Ar 100%)			P 0219 S 0220 CMT 0920	P 0530 S 0531	P 0057 S 0638 CMT 0878	CMT 0918		
	SP2								

S....Standardprogram P....Pulsprogram CMT....Cold Metal Transfer C-P....CMT Puls SFI

Example of a welding program database

- (1) Material type
- (2) Number of welding program database
- (3) Date of last revision
- (4) Wire diameter

Terms and abbreviations used

General

The terms and abbreviations listed here are used in connection with functions that are either included in the standard scope of supply or that are available as optional extras.

Terms and abbreviations A - C

AL.c

Arc length correction

Up and down correction limits for the arc length (job correction)

AL.1

Arc length correction 1

General arc length correction (job correction)

AL.2

Arc length correction 2

Arc length correction for the upper operating point of the pulsed welding power (SynchroPulse)

Arc

Arc

Arc break watchdog

ASt

Anti-stick

For reducing the effect of a "sticking" rod electrode (MMA welding)

bbc

Burn-back time correction

C-C

Cooling unit cut-out

In position "Aut", the cut-out is automatic depending on the coolant temperature. In position "On" / "Off", the cooling unit remains permanently switched on/switched off. Separate adjustment for the MIG/MAG and TIG processes is supported.

COr

Correction

Gas correction ("Digital gas control" option)

CSS

Comfort stop sensitivity

Sensitivity of the response characteristic of the TIG comfort stop function The TIG Comfort Stop function supports the TIG welding process without torch trigger. A downslope is triggered by briefly lifting or lowering the welding torch (ramp decrease of the welding current).

C-t

Cooling time

Time from when the flow watchdog is triggered until the "no | H2O" service code is output.

Terms and abbreviations D - F

dFd

delta Feeder

Welding power offset for the SynchroPulse option (defined by the wire feed speed)

dYn

dynamic

Arc force dynamic correction for standard arcs, pulse correction for pulsed arcs or correction of various parameters in CMT (job correction or arc force dynamic and pulse correction settings in the Setup menu for the Standard control panel)

EIn

Electrode line

Characteristic selection (MMA welding)

F

Frequency

Frequency for SynchroPulse option

FAC

Factory

Reset welding system

FCO

Feeder control

Wire-feed unit cut-out (wire-end sensor option)

Fdc

Feeder creep

Feeder creep speed

Fdi

Feeder inching

Feeder inching speed

Terms and abbreviations G - I

GAS

Gasflow

Set value for shielding gas flow ("Digital gas control" option)

GPo

Gas post-flow time

GPR

Gas pre-flow time

Gun

Gun (welding torch)

Changing between modes with the JobMaster torch (optional) ... 0 / 1

HCU

Hot-start current

Hti

Hot-current time

(MMA welding)

I-E

I (current) - End

Final current

I-S

I (current) - Starting

Starting current

Ito

Ignition time-out

Terms and abbreviations J - R

Job	Job whose parameters are to be adjusted (job correction)
JSL	Job Slope Defines the time between the job that is currently selected and the next job
L	L (inductivity) Displays welding circuit inductivity
P	Power-correction Welding power correction (defined by the wire feed speed, job correction function)
P-C	Power-Control For defining the Master or Slave power sources when two power sources are operated in parallel
PcH	Power correction High Correction boundary (high) for the welding power (job correction)
PcL	Power correction Low Correction boundary (low) for the welding power (job correction)
PPU	Push-pull unit
r	r (resistance) Determine welding circuit resistance

Terms and abbreviations S

SEt	Setting Country-specific setting (Standard / USA)
SL	Slope
SPt	Spot welding time
Stc	Wire-Stick-Control Detection of a sticking wire end
S2t	Special 2-step (US control panel only) For selecting jobs and groups by pressing the torch trigger
S4t	Special 4-step (Gun-Trigger option) Switch between jobs using torch trigger while "Special 4-step" mode symbol is displayed on JobMaster torch

Terms and abbreviations T - 2nd**t-C**

Twin Control

For defining the leading or trailing power sources in the TimeTwin Digital process

t-E

time - End current

Final current duration

t-S

time - Starting current

Starting current duration

tri

Trigger

Subsequent correction of the mode

Uco

U (Voltage) cut-off

Welding voltage limitation during MMA welding Makes it possible to stop the welding process by slightly raising the rod electrode.

2nd

Second level of Setup menu

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